FOOD INDUSTRIES

manufacturing and processing

A McGRAW-HILL PUBLICATION—ESTABLISHED 1928

H. C. PARMELEE, *Editor*

New York, September, 1930

VOLUME 2 . . . NUMBER 9

When Advertising Pays Most

EVER SINCE the present decline became apparent, business has been speculating on which are the depression-proof industries. An interesting compilation of the earnings for the first half of the year of 150 national advertisers is found in *Printers' Ink*, Aug. 21, 1930. The 1930 net income of representatives of all industries before dividends is twenty-six per cent lower than the amount that was earned in the corresponding period of 1929.

BUT it is most interesting to learn that the twenty-one food manufacturers in this group show a gain in net earnings of eleven and six-tenths per cent. At the same time the other one hundred twenty-nine non-food manufacturers show a thirty and five tenths per cent decline in earnings. In the food group, thirteen show higher earnings than in the corresponding period in 1929, and in no case, in the group of food manufacturers whose half-yearly statements are available, is there a deficit, although many of those in the general group of manufacturers that was investigated were not so fortunate.

OUR OWN further observation is added to these published facts. The principal ones in this field which are experiencing diminished profits appear to be producers of non-advertised food products.

ALL OF THIS is an important indication of the fundamental stability of the food industry, but it shows also that consumer advertising is playing a vital rôle in food merchandising. In addition to creating a market, it is holding the market when others are not so fortunate.

INTERPRETING it still further, it means that combinations of producing units in the food field that form corporations large enough to engage in national advertising offer a way to greater security in times of stress and to lessened sales resistance at all times.

THE interview with John Hartford, president of A. & P., recently published in the New York *Times*, is a veritable prophecy: "We do not attempt to push our own brands. We leave it to our customers to buy what they want. Of all the food products we handle, only 10 per cent comprise private brands which may be regarded as strictly competitive with national labels. . . . The principal work of our company is as merchandisers. We believe that the national manufacturers are competent in their own field. . . ."

IT IS as important to prepare for peace in time of war as it is to prepare for war in time of peace, and we feel that it is now time to be planning for the future. A part of the strategy is admittedly outside the province of the production man, but he has an indispensable rôle to fill. Quality must be the paramount basis for successful advertising. Next to quality in the production man's sphere are reasonable costs. These are his job and nobody else's. With both of these qualifications satisfied, consumer advertising becomes an investment and an insurance of profits even in times of poor business.

EDITORIALS

SEPTEMBER, 1930

Is Long-Range Weather Forecasting Desirable?

IT HARDLY seemed possible that the subject of the weather would ever come in for editorial discussion, but the meteorological events, or lack of events, of the past month are ample justification for comment. The drought should give pause to every food manufacturer and distributor, for the industry is reminded of its dependence on agriculture for raw materials with the forcefulness of a slap in the face.

Earlier in the year, when reports of acreages either intended or actually planted were published, it appeared to FOOD INDUSTRIES that only a mild drought could save some of the industries from their own folly. But nothing like the weather which we have experienced was anticipated or even regarded as a possible blessing in disguise. Providence has apparently overdone the curtailment of raw-material production.

Events like the prolonged drought of 1930 don't "just happen." They have causes that probably antedate the event by many days and perhaps even months. If they could be observed and correctly interpreted we would be in possession of a system of long-range weather forecasting.

But suppose that we had known, in April or May, that this was to be a rainless summer. What could we have done about it? How could we best have turned such knowledge to advantage? FOOD INDUSTRIES would like to publish letters from readers that would analyze their own particular problems and show how accurate long-range weather forecasting would or would not be of value to them. A Western manufacturer stated in 1920 that he positively did not want to know of the crop disasters ahead—he had enough troubles without that. But was he right?

The Value of an Educated Nose

THOUGH the least cultivated, man's sense of smell is not the least keen of his senses. In the few cases where individuals have deliberately cultivated the ability to discern odors the results are almost uncanny. For example, the May number of FOOD INDUSTRIES gave an account of a coffee roasting plant which, although equipped with the most modern machinery available, depended for its plant control on the sense of smell and taste of a group of skilled coffee tasters. Also, the perfumer is an artist with odors and all good cooks have the olfactory sense well developed.

Workers in the food industries often depend on the odors of the products they are working with to detect variations in quality, even when the dependence may not be conscious or deliberate. Recently, however, a chemist deliberately set himself the task of collecting the odors emanating from the different steps in fish canning and correlating them with normal or abnormal operation of these steps. By so doing he hopes to be able to tell at once when he enters a cannery or smells its finished product just how well the canning process has been carried out. Certainly, this is an ambitious program, but it is one quite possible of successful completion and of admitted value. Likewise, it is one that might well be emulated by all who make products that must appeal to the consumer's nose and palate.

Psychological tests have shown that chemists are among those having the most sensitive noses. It would seem then that a food factory chemist with an educated nose could save himself a tremendous amount of work in investigating difficulties if his sense of smell were able to point out the most likely source of trouble—if he could "follow his nose." Perhaps it would be a good idea if other chemists, like the one just mentioned, were to attempt a correlation of all the known odors of their products with the freshness of raw material, time and temperature of processing, exposure to air, light and metals, or any other thing that might affect them. If records were kept, out of them might come simplified methods of control, or perhaps a classification of odors that would be extremely valuable to others in the same field.

The Federal Food Law Must Not Be Weakened

AFTER wading through the 218 pages of testimony at the hearing before the Secretary of Agriculture entitled "In the Matter of Regulations Concerning the Labeling of Food Products Containing Corn Sugar," one concludes that keeping opposing factions from combat is not an attribute of the present administration. If ever a government official opened a Pandora's Box of troubles it occurred on July 25, 1930, and the suspicion is growing into a belief that it will be some time before the lid is nailed down again on this package of problems.

But since Mr. Hyde has permitted the factions to clash, let us briefly examine the case of starch sugar, "corn sugar" or dextrose. Here is a perfectly wholesome foodstuff manufactured in a large way by a well-organized and well-managed industry. Its proponents seek a modification of the federal labeling regulations so that it may be used in the manufacture of preserves, jams, pickles, jellies, canned foods, condensed milk, fruit butters, catsup, chocolate, bottled beverages, and similar products, without declaration of its presence on the label. They want it placed on the same basis as its use in certain

cured meat products, ice cream, bakery products, and confections, without declaration.

Logic seems to be all on the side of starch sugar or dextrose. If it is proper for the last four groups of products to be made with undeclared dextrose it would seem to be logical for the manufacturers of the other groups to use it, which is exactly the contention of its manufacturers.

Nevertheless, there is the matter of tradition. Certainly it is not traditional to make the exemptions with dextrose and the law is largely based on the generally accepted historical concept of the composition of these products.

Logic and tradition are here opposed. The theory of the deceptiveness of the use of undeclared dextrose is based on traditional concepts, and if the practice constitutes deception, the morals of the question are directly opposed to the logic of it.

However, with the score now 1 to 1, there enters a third set of factors. At this hearing the manufacturers of maltose were represented, armed with every plea and argument that can be advanced for dextrose, plus the added feature of a higher food value, measured in calories; and, furthermore, maltose is alleged to contain vitamins A and C. Little can be adduced for dextrose that cannot be also said with equal weight of maltose, and the malt sugar folks insist that they, too, shall be allowed any exemptions that may be granted to dextrose.

The question now becomes not one of application of logic to an inconsistent situation but really becomes one of whether or not the food law of the country shall be undermined and allowed to lose the strength that is the basis for the food industries of today. It must be obvious to all that once a little leak is allowed to develop in the dike, the whole structure immediately becomes unsafe.

FOOD INDUSTRIES has no quarrel with the use of dextrose, but is opposed to any weakening of the law, for once the existing legal structure begins to disintegrate the whole industry of food manufacture will be very badly demoralized and will suffer for many years. As a means of agricultural relief it does not appeal to us as so sound a method as a plan to reforest submarginal lands. And to those whose appeal for revision of regulations is based only on logic or consistency we would point out that, just as adjudication is sometimes a boomerang, so their present activities may possibly result in new regulations that tend to clarify and reconcile the inconsistencies in an unexpected manner. All exemptions might be revoked.

Facing Unpleasant Facts

ONE of the underlying causes that contribute to high prices for cattle is a disease seldom considered in this relationship—not tuberculosis, nor foot and mouth disease, both of which have taken a toll, to be sure, but contagious abortion. This cattle disease is a factor of importance, contributing its share to the high cost of the raw materials of the beef packer. The cost to the cattle industry alone from this one cause is conservatively estimated by the Bureau of Animal Industry to be at least $50,000,000 annually and the prevalence of the malady is increasing.

Infectious abortion is seldom fatal to adult animals but it greatly reduces the calf crop by both direct and indirect effects: directly by producing dead calves and indirectly by the temporary or permanent sterility that frequently follows the abortion. Furthermore, in order that the stock owner may successfully combat the disease it often becomes economically necessary to sell cows for slaughter that have become carriers of the infection although they are otherwise healthy. The only safe alternative is to isolate them to prevent the disease from spreading to other animals that are free from the disease. The economics of the situation are most frequently against such a course, and the net result is a dead, worthless fetus and an otherwise good cow sold for slaughter. Unfortunately, however, the necessary machinery is not in existence to guarantee to a farmer, in the normal routine of events, that cows that may be purchased to replace those infected are immune, not sterile, or even uninfected.

All of this is quite apart from the public health aspect of contagious abortion, for the bacteria causing the infection occasionally find their way into milk and when consumed raw by humans may cause undulant fever—a relatively newly recognized disease. Pasteurization is the only proper safeguard, outside of actual medical certification. Those who are interested in this phase of the subject are cautioned that an immune animal is not necessarily an uninfected animal.

Attention is directed to this serious situation because it is one that is frequently overlooked and because packers' earnings are indirectly affected, to a considerable extent, by this cattle disease. This scourge, in addition to the consumer trend toward beef from smaller animals than formerly, tends toward higher prices and decreased volume of business. But although a number of separate investigations of contagious abortion are under way, it would appear that ultimate relief is still a long way from being attained.

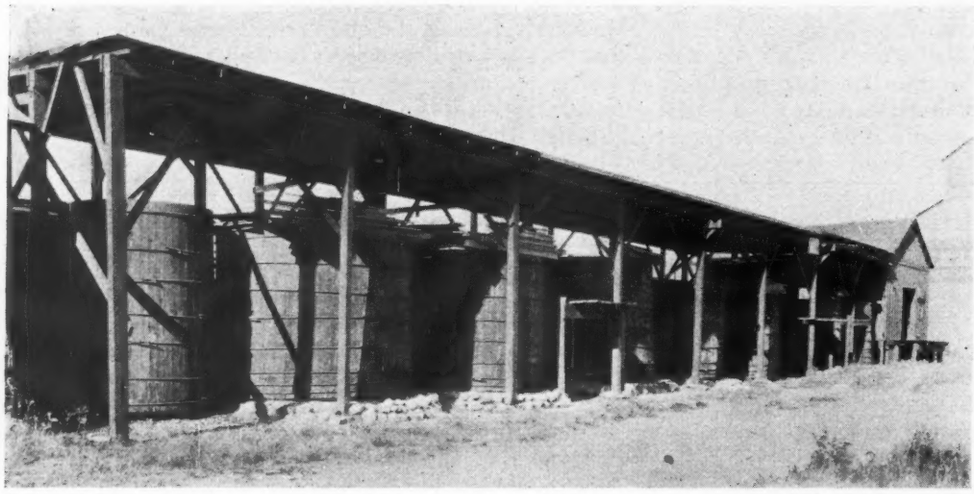
Prepare Today For Tomorrow's Business

MANY of the great fortunes of this country have been made by those who, when prices were low, saw the opportunity to invest wisely in stocks or real estate. Successes of this kind have been much in the public eye. But there is another way in which the foundation of fortune can be laid in times of low prices, a way that has not received the attention due it, a way that is particularly open to manufacturers.

Reference is made to the unusually favorable opportunity given by present conditions for bringing plants to a state of readiness for the business revival that will surely come. Slack business now offers a chance for modernization without interference with routine activities, such as may not come again in a long time.

The factors that particularly favor such action are numerous. Materials of construction and equipment are readily available at reasonable prices. Money is easy. Efficient labor is abundant and fairly cheap. Many manufacturers have surplus funds, earned in years of flush operation, that can be put to no more fruitful service than that of plant modernization.

Those who see this opportunity and grasp it will be laying a fine foundation for future success. It is certain that, when business once again starts to improve, competition will be keener than ever. The plant that is so equipped as to operate at minimum cost will have taken the first, and perhaps the most important, step to assure satisfactory profits in the face of this competition.



An open type of salting station at the beginning of the season

ALLOCATING COSTS
In a Complex Field

By F. OLNEY BROWN
Squire Dingee Company, Chicago

ESTABLISHED PRACTICE in the pickle industry sanctions the pricing and marketing of finished goods on a sliding scale arbitrarily determined and not bearing a direct relation to either the cost of the raw material or the cost of processing. For this reason it is necessary to apportion the costs among the various grades of product on the basis of their selling price, regardless of the true cost entailed in their manufacture. Only in this way may all the expense that is incurred be properly allowed for, while at the same time all grades of goods are priced at a figure that will give them a chance against competition.

In our methods of cost finding, which doubtless are similar to those of other pickle manufacturers, we have found it necessary to divide the cost work into three main parts. In accordance with the progress of goods through the manufacturing operation there are three steps in cost finding: (1) determination of unit cost of raw material at the end of the first step of manufacture; i.e., determination of the cost per bushel of brine stock; (2) determination of the unit cost of bulk finished goods; i.e., the cost per cask of vinegar stock; (3) the determination of the unit cost of packaged finished goods; i.e., the cost per dozen of glass goods.

An attempt is made to place in each division every item that directly contributes to the cost of that operation and to leave only the most general of the selling and administrative expenses to be spread over all items on the basis of the percentage of total sales. The reason for doing this is the natural one that we wish to be able to compare our own costs with the market prices for either semi-finished goods (brine stock) or bulk finished goods before packaging in consumer sizes (i.e., vinegar stock—barreled sweet or sour pickles, relishes, and the like), because we might be forced to purchase at these prices in case our own sources of semi-finished goods were found to be inadequate to take care of our demand.

This article will discuss only the first of the three phases of cost finding in the pickle industry; namely, cost allocation in the production of semi-finished goods, leaving the study of the other phases to later discussions, for the succeeding steps must be based on sound thinking applied to the first step. A very brief description of the various preparations for the pickle season is necessary in order that one outside the pickle field may visualize the problems and understand the need for the slight mathematical treatment of some of the cost items.

Very soon after the first of the year it is the custom in the pickle industry to begin contracting with farmers in the territory contiguous to the salting stations, for the raising and sale of cucumbers. The management has already determined its policy for the year, which involves such matters as the salting stations that shall be operated; those that shall be abandoned; the total acreage that shall be solicited; the sizes of cucumbers that shall be accepted, and the prices to be paid to the growers for them.

All these decisions are predicated on a number of constantly changing factors that have an important influence on the conduct of affairs of any concern in the business of salting and finishing cucumber pickles. Such factors include the size of the crop of preceding years; the size of the carryover; possible losses of salt stock due to fires, leakage of brine from tanks, or spoilage; changed public demand, bringing about a corresponding shortage or surplus of certain sizes or types of pickles; competition for raw materials by other pickle salters; competition for acreage by local markets or other crop outlets;

appearance of crop diseases; and economic conditions in the territory where salting stations are located.

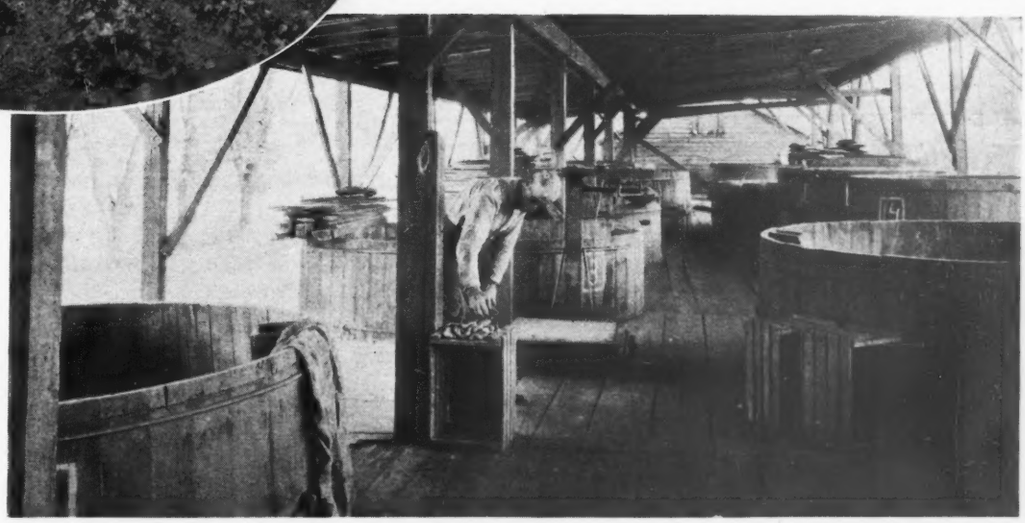
Just how local economic conditions in the cucumber raising territory can affect the policy of a pickle manufacturer is better understood when it is explained that picking cucumbers is very arduous work. During the 6 to 8 weeks of the harvest, the cucumbers must be picked every day, in order to keep them within the small sizes from which both the farmer and the pickle salter obtain the greatest return. If the picking is neglected for a day, the cucumbers may become so large as either to exceed the limit entirely for which they are acceptable to the salter or else they may fall into a cheaper grade for which the farmer receives only about 30 per cent of the return that he would receive for the first grade of smaller pickles. The larger cucumbers also draw the sap from the vines and shorten their life. One person can hardly pick more than a half acre a day, hence this must be the limit that a farmer can plant unless he has helpers. In one state where the automobile industry has drawn very heavily upon the rural population, farmers cannot obtain the help they formerly had, and pickle manufacturers, accordingly, find it more difficult to obtain the desired acreage in this state.

Acreage contracting proceeds throughout the winter months and early spring, and is followed by the work of distributing the seed to the growers. Seed usually is furnished free by the salters, as part of the contract. In return for the free seed the farmer agrees to deliver all of his crop of cucumbers to the salter who furnishes the seed. To the grower, pickles are pickles whether they are long or short, straight or crooked, slender or stubby, and, therefore, seed must be secured from the very best stock in order to obtain cucumbers of the most desirable proportions.

It should be pointed out here that one of the most difficult problems in our business is due to the fact that we are entirely dependent upon nature as our source of supply and, in a large way, for the success of our business. We contract to take all of the yield from the seed that we distribute and, while our association and government statistics give us a figure representing the normal yield per acre as a guide to follow in determining the number of acres that we should plant to meet our requirements, still we must have adequate empty tanks, salt, and other equipment available for use in case nature gives us an abnormally large yield. The pickles must be placed in brine within 24 hours after they are picked or they become wilted and worthless, so that there is not much time in which to secure extra equipment at the last minute. All must be adequately prepared for in advance. This affects considerably the cost of operation, because the overhead and investment usually are considerably higher than actually needed to take care of the average crop.

Following the same line of reasoning, it is well to point out that labor, station expenses, and overhead vary from year to year, depending on the size of the crop. Men must be constantly on hand during the harvesting season at the salting stations to take care of the cucumbers that are delivered by the farmers and, of course, this labor cost runs on regardless of whether there is a very small number coming in or whether the men are kept busy to the maximum degree. In the same way all of the tanks, cooperage, and equipment must be kept in order for a maximum yield, for which the expense will be just as much if only a minimum yield be received.

The farmers are paid in cash upon delivery of the cucumbers from day to day throughout the harvesting season and at the prices that were determined at the time the acreage was contracted. This means that in the case of an abnormally large crop the salter is paying just as much per bushel for his material as during a small crop, although with the large crop the abundance of supply immediately lessens its resale value in the finished goods. The salter or packer in this industry absorbs the risk that the farmer generally has with his other crops, and it is one very favorable talking point in getting him to raise cucumbers. Of course, the farmer is dependent on nature for his dollar-and-cents



Above:
A well-kept pickle patch
Right:
A salting station ready for business. The boards on the tops of the tanks are "covers" to keep the cucumbers submerged in the brine

DIFFERENTIAL CARD—Prices On Casks Given as Basis to Figure On

Example: If the selling price of a 45 or 48 gal. cask is $9.75, a 30 or 32 gal. barrel would be $7.00; 15 or 16 gal., ½ bbl., $4.25; 10 gal. keg, $3.35; 5 gal. keg, $2.05; 5 gal. glass, $3.05; 1 gal. glass, $5.60 per dozen; 1 gal, cans, $4.25 per dozen.

45 Gal Casks	30 Gal. Bbls.	15 Gal. ½ Bbls	10 Gal. Kegs	5 Gal. Kegs	5 Gal. Glass	Gal. Glass Per Doz.	Gal. Cans Per Doz.
$ 9.75	$ 7.00	$ 4.25	$ 3.35	$ 2.05	$ 3.05	$ 5.60	$ 4.25
10.50	7.50	4.50	3.50	2.10	3.10	5.85	4.50
11.25	8.00	4.75	3.70	2.20	3.20	6.00	4.70
12.00	8.50	5.00	3.85	2.30	3.30	6.30	4.95
12.75	9.00	5.25	4.00	2.35	3.35	6.50	5.15
13.50	9.50	5.50	4.20	2.45	3.45	6.70	5.35
14.25	10.00	5.75	4.35	2.55	3.55	6.95	5.60
15.00	10.50	6.00	4.50	2.60	3.60	7.15	5.80
15.75	11.00	6.25	4.70	2.70	3.70	7.50	6.00
16.50	11.50	6.50	4.85	2.80	3.80	7.75	6.25
17.25	12.00	6.75	5.00	2.85	3.85	8.00	6.50
18.00	12.50	7.00	5.20	2.95	3.95	8.20	6.70
18.75	13.00	7.25	5.35	3.05	4.05	8.40	6.90
19.50	13.50	7.50	5.50	3.10	4.10	8.65	7.15
20.25	14.00	7.75	5.70	3.20	4.20	8.85	7.35
21.00	14.50	8.00	5.85	3.30	4.30	9.10	7.60
21.75	15.00	8.25	6.00	3.35	4.35	9.30	7.80
22.50	15.50	8.50	6.20	3.45	4.45	9.50	8.00
23.25	16.00	8.75	6.35	3.55	4.55	9.75	8.25
24.00	16.50	9.00	6.50	3.60	4.60	9.95	8.45
24.75	17.00	9.25	6.70	3.70	4.70	10.15	8.65
25.50	17.50	9.50	6.85	3.80	4.80	10.40	8.90
26.25	18.00	9.75	7.00	3.85	4.85	10.60	9.10
27.00	18.50	10.00	7.20	3.95	4.95	10.85	9.35
27.75	19.00	10.25	7.35	4.05	5.05	11.30	9.55
28.50	19.50	10.50	7.50	4.10	5.10	11.50	9.75
29.25	20.00	10.75	7.70	4.20	5.20	11.75	10.00
30.00	20.50	11.00	7.85	4.30	5.30	11.95	10.20
31.50	21.50	11.50	8.20	4.45	5.45	12.40	10.65
33.00	22.50	12.00	8.50	4.60	5.60	12.85	11.10
34.50	23.50	12.50	8.85	4.80	5.80	13.50	11.50
36.00	24.50	13.00	9.20	4.95	5.95	14.00	12.00
37.50	25.50	13.50	9.50	5.10	6.10	14.40	12.40
39.00	26.50	14.00	9.85	5.30	6.30	14.85	12.85
40.50	27.50	14.50	10.20	5.45	6.45	15.30	13.30
42.00	28.50	15.00	10.50	5.60	6.60	15.75	13.75
43.50	29.50	15.50	10.85	5.80	6.80	16.20	14.20
45.00	30.50	16.00	11.20	5.95	6.95	16.60	14.60
46.50	31.50	16.50	11.50	6.10	7.10	17.25	15.00
48.00	32.50	17.00	11.85	6.30	7.30	17.75	15.50
49.50	33.50	17.50	12.20	6.45	7.45	18.20	15.95
51.00	34.50	18.00	12.50	6.60	7.60	18.60	16.40
52.50	35.50	18.50	12.85	6.80	7.80	19.00	16.80
54.00	36.50	19.00	13.20	6.95	7.95	19.50	17.25
55.50	37.50	19.50	13.50	7.10	8.10	19.95	17.70
57.00	38.50	20.00	13.85	7.30	8.30	20.40	18.15
58.50	39.50	20.50	14.20	7.45	8.45	20.85	18.60
60.00	40.50	21.00	14.50	7.60	8.60	21.25	19.00
61.50	41.50	21.50	14.85	7.80	8.80	22.00	19.50
63.00	42.50	22.00	15.20	7.95	8.95	22.40	19.90
64.50	43.50	22.50	15.50	8.10	9.10	22.85	20.35
66.00	44.50	23.00	15.85	8.30	9.30	23.30	20.80
67.50	45.50	23.50	16.20	8.45	9.45	23.75	21.25
69.00	46.50	24.00	16.50	8.60	9.60	24.15	21.65
70.50	47.50	24.50	16.85	8.80	9.80	24.60	22.10
72.00	48.50	25.00	17.20	8.85	9.85	25.00	22.50
73.50	49.50	25.50	17.50	9.10	10.10	25.50	23.00
75.00	50.50	26.00	17.85	9.30	10.30	25.90	23.40
76.50	51.50	26.50	18.20	9.45	10.45	26.60	23.85
78.00	52.50	27.00	18.50	9.60	10.60	27.00	24.30
79.50	53.50	27.50	18.85	9.80	10.80	27.50	24.75
81.00	54.50	28.00	19.20	9.95	10.95	28.00	25.20
82.50	55.50	28.50	19.50	10.10	11.10	28.35	25.60
84.00	56.50	29.00	19.85	10.30	11.30	28.75	26.00
85.50	57.50	29.50	20.20	10.45	11.45	29.25	26.50
87.00	58.50	30.00	20.50	10.60	11.60	29.75	27.00
88.50	59.50	30.50	20.85	10.80	11.80	30.15	27.40
90.00	60.50	31.00	21.20	10.95	11.95	30.55	27.80
91.50	61.50	31.50	21.50	11.10	12.10	31.25	28.25
93.00	62.50	32.00	21.85	11.30	12.30	31.75	28.75
94.50	63.50	32.50	22.20	11.45	12.45	32.25	29.25
96.00	64.50	33.00	22.50	11.60	12.60	32.75	29.75
97.50	65.50	33.50	22.85	11.80	12.80	33.00	30.00
99.00	66.50	34.00	23.20	11.95	12.95	33.50	30.50
100.50	67.50	34.50	23.50	12.10	13.10	34.00	31.00

Reproduction of a manufacturer's pickle differential—very important in the pickle business

yield per acre, but his unit price for whatever he gets has been established beforehand, and cash is paid upon delivery. He does not have to carry any stock or take a chance on the market.

All of the items and factors that have been enumerated must be ultimately accounted for in the following table, which makes up the first division of pickle costs:

Table I—Brine Stock Cost

1. Cash paid farmers	.....
2. Salt and water	.....
3. Station expense and overhead	.....
4. Freight to finishing plant	.....
5. Sorting labor	.....
Total cost	.....

Prices paid for cucumbers may vary in different sections; therefore what a company pays at one receiving station may not necessarily be the same as at another. Labor, freight, and other expenses also vary with the station; so, rather than figure the bushel cost of pickles from each station separately, we group them all together. Thus, the per bushel cost of each item is determined at the end of the season by dividing the total number of bushels received from all sections by the total number of dollars paid for that material, or item of expense.

Item No. 3 above includes: Station labor, maintenance, repairs, depreciation, and interest on buildings, tanks and equipment; light, heat, power, engine-room supplies; superintendence; rents, state and city taxes; and any other miscellaneous expense directly applicable to salting pickles.

Item No. 5 covers work done at our central finishing plant but is included in the first division of pickle costs because it is an operation necessary before pickles are marketable as sorted brine stock.

To one not engaged in this business, the matter of allocating the costs may appear to be simple, for ostensibly a given number of bushels of pickles salted down in brine must cost a certain number of dollars. It might appear that the final cost per bushel would be determined by the simple procedure of dividing the total expenditure by the total number of bushels received. Such a hypothetical assumption, however, is not practical, as will be explained.

Cucumbers for salting are purchased at the present time largely on the basis of three different sizes, or classification grades, that are paid for at different prices, and, when salted, have quite different market values. The classification grades for purchase as green fresh cucumbers are:

1. Small, or vat-run; i.e., straight cucumbers up to 3 or 3½ in. long.
2. Large; i.e., straight cucumbers from 3 to 3½ in. long up to 5 or 5½ in.
3. Nubs and crooks; i.e., misshapen cucumbers, both the stubby and curved and crooked ones. A limited market exists for pickles made from irregularly shaped cucumbers and, because their growth on the farm still seems to be inevitable, the pickle salter usually will purchase them at a small price but with the important proviso that they are not to be over 3½ in. long. Nubs and crooks larger than this size are not accepted.

The growers, under their contract, must sort their cucumbers to these three grades before delivery to the receiving stations.

Items Nos. 2, 3, and 4 in Table I are of the same expense for each of the three grades of cucumbers, but the price paid to the farmer (Item No. 1) and sorting

labor (Item No. 5) vary for each of the three grades. Sorting is done on a straight time basis, and to sort small pickles counting 1,000 to the bushel obviously takes longer and is, therefore, more expensive than sorting large pickles counting 200 to the bushel. It is necessary, therefore, to figure the total cost per bushel in brine of each grade separately.

Even this would seem simple enough, but there remains yet an element which requires considerably more work for the cost accountant. The cost of each of the three grades (small, large, nubs and crooks) must be broken down still further, because of the fact that each grade is sorted within itself in many different sizes according to the count of the pickles to the 45-gal. cask. In our company, *small* pickles, as purchased from the farmer, are sorted into nine sizes; *large* are sorted into six; and *nubs and crooks* into six. Each size within a given grade actually has the same brine-stock cost as the other sizes in the same grade, but the market basis of the industry since its very beginning places a different price value on each size.

The following price list is taken from a recent issue of the *Canner:*

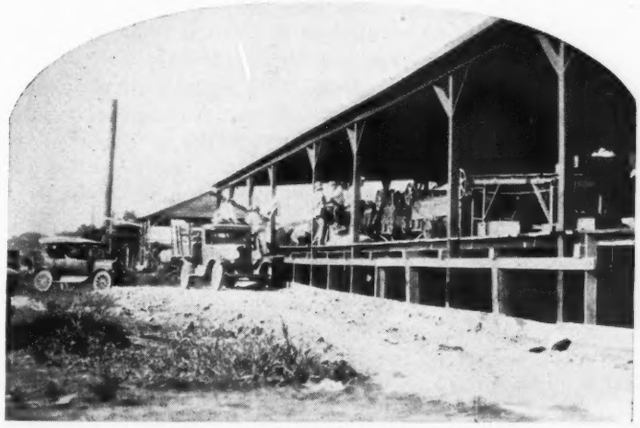
Table II—Pickle Price-Current

F.o.b. factory quotations by packers for prompt shipment.

SOURS			DILLS		
Mediums	1,800 count	$22.50	Large	600 count	$17.50
Small med	2,700 count	25.50	Large	800 count	18.50
Smalls	3,600 count	28.50	Large	1,000 count	19.50
Gherkins	4,500 count	30.00	Medium	1,800 count	22.50
Gherkins	6,000 count	36.00	Small medium	2,700 count	25.50
Small ghk	10,000 count	52.50			
Ex. small ghk	15,000 count	65.00	SWEETS		
Midgets	20,000 count	75.00	Chow		$50.00
Mixed pickles		32.50	Mixed		45.00
Chow Chow		42.00	Relish		42.00
Large	600 count	17.50	Sliced med	3,600 count	39.00
Large	800 count	18.50	Sliced small med.	5,400 count	42.00
Large	1,000 count	19.50	Smalls	3,600 count	42.00
Large	1,200 count	20.25	Smalls	4,500 count	45.00
Large	1,500 count	21.50	Gherkins	6,000 count	48.00
			Small ghk	10,000 count	61.50
			Ex. small ghk	15,000 count	80.00
			Midgets	20,000 count	90.00

45-gal. casks, f.o.b. factory, Chicago rate of freight for prompt shipment Carload lots.

When the price of a cask of the finished vinegar stock counting 600 to the 45-gal. cask is $17.50, 1,800 count might be priced at $22.50, and 6,000 count at $36. As the market advances or declines, so does each size, maintaining the same approximate differential between sizes; by "differential" is meant the spread between the prices of the various sizes of pickles. The market of the semi-finished pickles (brine stock) also retains proportionate differentials between the various sizes.



Salting station equipped with sorting machine to sort green cucumbers. Formerly the sorting machine was at the processing plant

Bringing the cucumbers to the station. They come in anything from a wheelbarrow to a sedan

It may readily be seen that if costs of any grade were to be used for costs of the whole range of sizes, one size would show a large margin of profit while another would be very small or even a net loss. For example, 600-count at $17.50 would not show the margin that 1,500-count at $21.50 would bring, if both costs were figured alike, and both of these sizes are sorted from stock purchased from the farmer as large pickles and therefore at the same price. In order to avoid this, we allocate the costs of a grade to the various sizes, in order to bring the differentials between them into proportion with the differentials in the market values of the finished product.

Other than the desire to show the same proportionate margin of profit on all sizes of pickles, there is further need for allocation of the costs on a scale similar to the selling price of the finished goods, because of the large volume of mixed pickles and relishes, which play an important part in any manufacturer's total production. Mixed pickles are those cut into small pieces with the addition of cut cauliflower, onions, green tomatoes, peppers, or other pickled vegetables, in accordance with the individual manufacturer's formula.

Pickles that have become broken in handling but that are otherwise perfectly sound are used and, from a manufacturing standpoint, mixes and relishes were created as an outlet for the broken stock. The volume has been built up today, however, to a point where it requires more than the usual percentage of broken pickles to satisfy the demand; consequently, whole pickles are being cut up both for mixes and relishes. Smaller pickles are more tender and, accordingly, supply a better quality of mixed pickles or relish than that cut from larger and coarser stock, so that most manufacturers have two grades of these products selling at different prices in accordance with their value—one cut from the smaller pickles and another from the large.

There are naturally different costs for these two grades, because prices that are different are paid to the farmer for larger than for vat-run pickles. But, taking each grade within itself, it may be seen that any one of the various sizes within the grade could be used and there would not be any difference in cost if the different sizes were not given different values. With a market established, however, that will bring more money for whole pickles of 6,000-size, for example, than for 3,600-size, it is to the manufacturer's advantage to retain the most valuable whole pickles and to use in the mixed pickles those that otherwise would bring in the

least return. Of course, there are times when we are forced to use smaller pickles than are necessary in mixed pickles or relishes, because of being entirely out of the other sizes, but in such cases we should know how much more our product is costing us because of failure to have the cheaper sizes, in order to judge whether it is worth while to accept further business without a higher price on mixed pickles.

In determining the differential basis of the brine stock costs we must first determine the percentage quantity of each size in the total quantity of the grade, which we do by checking the sorting records of several days' runs of representative stock over the sorting belt at the central finishing plant. Next we figure the percentage of dollars-and-cents differentials of the finished goods. For instance, if 45-gal. casks of 600-size sour pickles (600 pickles filling a 45-gal. cask and usually designated as 45/600) are selling at $17.50, 45/800 at $18.50, 45/1,200 at $20.25, and so on to the smallest sizes, the monetary price differential between sizes starts out at $1, but increases in size as the smaller and more valuable pickles are evaluated. It should be explained, parenthetically, that there is no standard of price differentials; each manufacturer utilizes a table of differentials that suits himself, but all are quite similar. The illustration's show tables of differentials. The first is the Squire Dingee table of differentials.

The principle we follow in figuring costs is that if the price placed on 45/600 sour pickles is $17.50 and on 45/1,500 sours is $21.50, thus giving a spread of $4, the same proportional spread should be made between the brine-stock costs of these two sizes.

Accordingly, $4 is approximately the same percentage of $21.50 as $0.27 is of $1.47 ($0.27 is the difference in the cost per bushel given in Table II). All other sizes are priced in relation to one another in proportion to the relation of the finished goods prices to each other.

This series of allocated costs, when multiplied by the number of bushels of pickles of the several corresponding sizes, should give a set of values which, when totaled, should equal the total expense for all the pickles, as shown in Table I. In case of a discrepancy the per-bushel costs must be readjusted until the allocated costs agree with the actual costs of Table I. The stages by which the cost per bushel is determined and tested is shown in Table III.

Table III—Brine Stock, Cost per Bushel of Large Pickles, on the basis of 150,000 bu. intake and average cost of $1.30

Size	Per Cent of Grade Determined by Sorting	Total Quantity Received, Bu.	*Cost per Bu.	Total Value
Large broken..	10	15,000	$0.82	$12,300.00
4/500.....	3	4,500	1.00	4,500.00
600.....	10	15,000	1.20	18,000.00
800.....	12	18,000	1.27	22,860.00
1000.....	15	22,500	1.33	29,925.00
1200.....	25	37,500	1.40	52,500.00
1500.....	25	37,500	1.47	55,125.00
Total.....	100	150,000	Weighted Average $1.30	$195,210.00

*To determine this column of figures is the sole purpose of this article.

Known factors are the total intake for the grade; i.e., 150,000 bu. of large pickles, the average per-bushel cost, and the percentages of each size. By multiplication of the third column by the fourth, we obtain a total which should equal the actual total in dollars and cents paid out for the cucumbers as determined by Table I. If they do not agree on the first attempt, we adjust the figures in the fourth column (cost per bushel) slightly up and down so that when multiplied out we will get approximately the same total as found in Table I.

The use of this "give and take" system may appear too haphazard to mathematically-minded cost accountants, but it gives us the same percentage of margin for each grade. And since nature cannot be controlled to raise only certain selected sizes of cucumbers, and because the established practice of marketing the finished goods is on a sliding scale regardless of costs, the system is proving quite satisfactory in application. Although its application is difficult to explain, only on the basis of a correct understanding of this accounting function can competition in the pickle business be placed on a rational footing.

The cost-per-bushel figure as determined by this method is used as the basis for further cost finding in the packing plant when the brine stocks are manufactured into finished pickles.

The advent of consumer packages has led to the need of quart jar differentials. This table was proposed in 1930

Quart Jar Differentials

As recommended by the Executive Committee

National Pickle Packers Association

45 Gal. Cask	Dump Pack Quarts (Plain or Mixed)	Place Pack Quarts
$ 9.75	$1.55	$1.65
10.50	1.60	1.70
11.25	1.65	1.75
12.00	1.70	1.80
12.75	1.75	1.85
13.50	1.80	1.90
14.25	1.85	1.95
15.00	1.90	2.00
15.75	1.95	2.05
16.50	2.00	2.15
17.25	2.05	2.20
18.00	2.10	2.25
18.75	2.15	2.30
19.50	2.20	2.35
20.25	2.25	2.40
21.00	2.30	2.45
21.75	2.35	2.50
22.50	2.40	2.55
23.25	2.45	2.65
24.00	2.50	2.70
24.75	2.55	2.75
25.50	2.60	2.80
26.25	2.65	2.85
27.00	2.70	2.90
27.75	2.75	2.95
28.50	2.80	3.00
29.25	2.85	3.05
30.00	2.90	3.15
31.50	3.00	3.25
33.00	3.10	3.35
34.50	3.20	3.45
36.00	3.35	3.55
37.50	3.45	3.70
39.00	3.55	3.80
40.50	3.65	3.90
42.00	3.75	4.00
43.50	3.85	4.15
45.00	3.95	4.25
46.50	4.05	4.35
48.00	4.15	4.45
49.50	4.25	4.55
51.00	4.35	4.70
52.50	4.45	4.80
54.00	4.55	4.90
55.50	4.65	5.00
57.00	4.80	5.15
58.50	4.90	5.25
60.00	5.00	5.35
61.50	5.10	5.45
63.00	5.20	5.55
64.50	5.30	5.70
66.00	5.40	5.80
67.50	5.50	5.90
69.00	5.60	6.00
70.50	5.70	6.15
72.00	5.80	6.25
73.50	5.90	6.35
75.00	6.00	6.45
76.50	6.10	6.55
78.00	6.20	6.70
79.50	6.35	6.80
81.00	6.45	6.90
82.50	6.55	7.00
84.00	6.65	7.15
85.50	6.75	7.25
87.00	6.85	7.35
88.50	6.95	7.45
90.00	7.05	7.55
91.50	7.15	7.70

Chicago, Illinois, March 15, 1930.

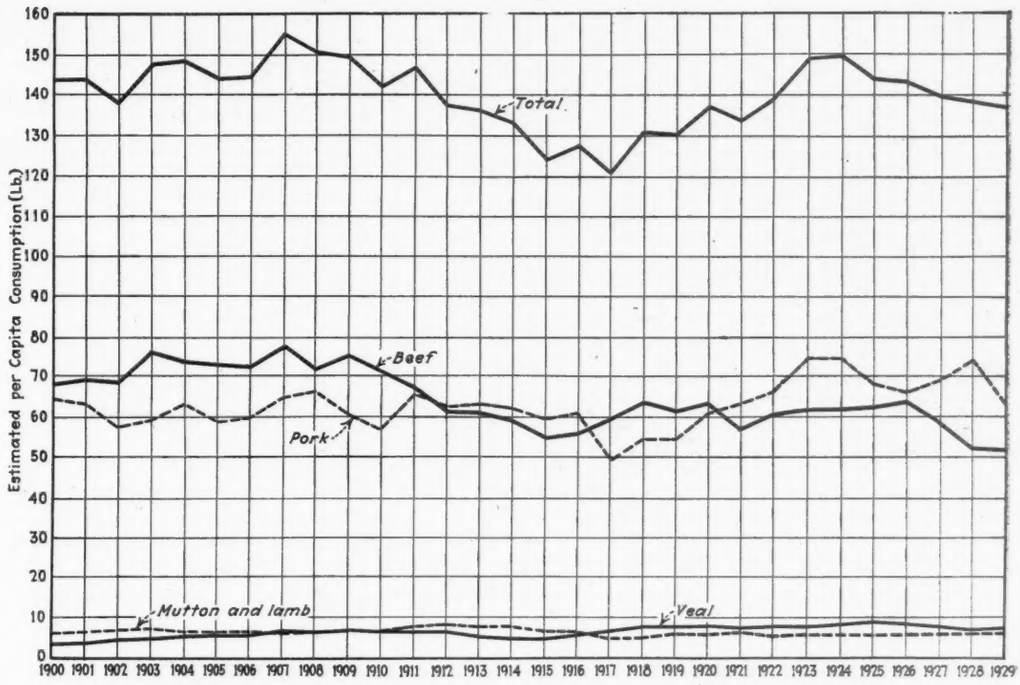


Fig. 1—Total meat consumption for the past 30 years shows periodic variations but no general trend

How Price Variations Affect

MEAT CONSUMPTION

By E. G. MONTGOMERY
Chief, Foodstuffs Division
U. S. Department of Commerce

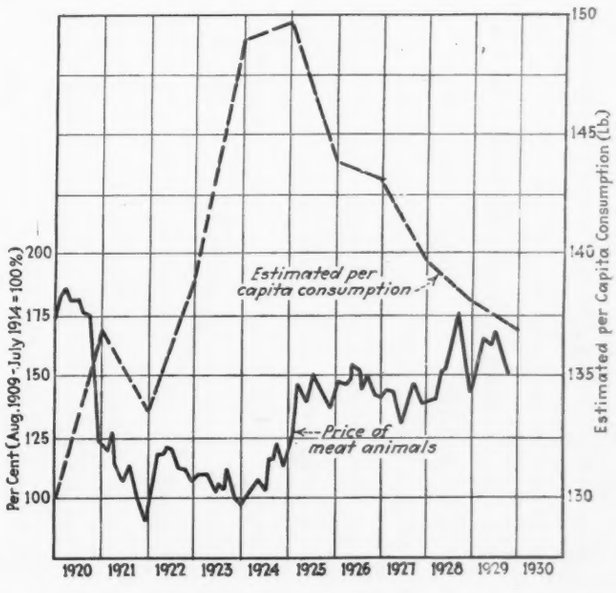
ALTHOUGH the per capita consumption of meats is practically the same today as it was 30 years ago, about 140 lb., it does show some interesting trends. Unlike some other food products that have shown a gradual change over a period of years, but exhibit little periodic fluctuations, striking variations in the consumption of meats have resulted from its decided response to price changes.

Meat reached its highest consumption level during the 30-year period in 1907, when 155 lb. per capita was used. It declined rather steadily to 1917, when it reached a low of 120 lb. per capita. Then it increased again for the next seven years, reaching 150 lb. per capita in 1924.

That the relative price of meat has a direct effect on consumption is shown in the accompanying charts. For example, during the past ten years, the 1921-1924 period was one of low-priced meat. Although this was also a period of unemployment and industrial depression, meat consumption went to a high level. During the 1925-1929 period meat animals were relatively higher priced, and consumption steadily declined from 149.7 lb. in 1924 to 136.8 lb. in 1929.

Marked shifts in consumption from one kind of meat to another are also brought about by relative price changes. For example, hog prices have shown a rather steady decline since 1925 (see Fig. 4), while cattle prices have advanced since 1926. As a result, there has been an increase of about 7 lb. per capita in pork consumption and a decline of 10 lb. in beef consumption.

Fig. 2—Inverse relationship between meat consumption and price is readily apparent



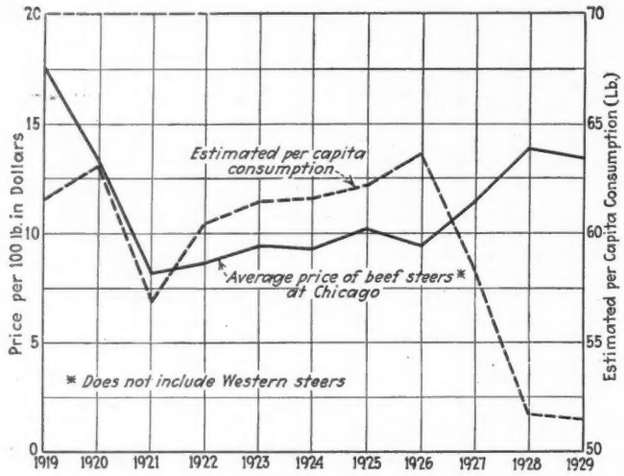

Price per 100 lb. in Dollars
Estimated per Capita Consumption (Lb.)
Estimated per capita consumption
Average price of beef steers* at Chicago
* Does not include Western steers
1919 1920 1921 1922 1923 1924 1925 1926 1927 1928 1929

Fig. 3—Consumption of beef has fallen considerably in the past ten years

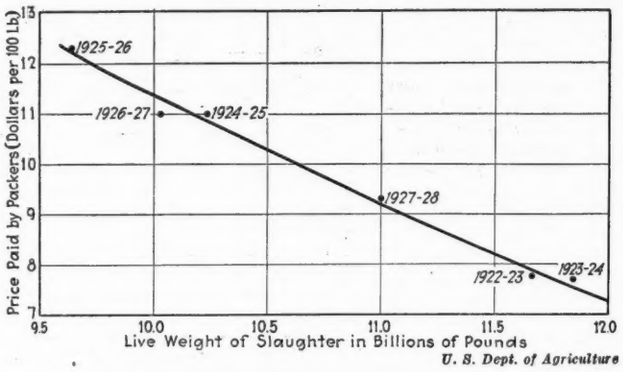


Fig. 5—The price-consumption relationship shown in the total weight of hogs slaughtered

Another means of showing the relation of price to consumption is illustrated in Fig. 5, which gives the total weight of hogs slaughtered at different prices. This indicates that at a price of about $12.50 per 100 lb., about 9½ billion pounds of hogs was slaughtered under federal inspection, while at about $8.25, the slaughter was 11½ billion pounds. In other words, the market absorbed about 21 per cent more at the lower price. Meat substitutes, as eggs and poultry, also play a part in influencing meat consumption, when relative prices justify a shift from one to the other.

Agricultural countries with cheap lands are ordinarily very high meat consumers, but as the country develops and meat becomes relatively higher in price there is a steady trend toward a lower meat consumption. Along about 1913 and 1914, many economists thought they saw this trend in the United States, for we had had a fairly steady yearly decline for a period of years. It is possible that this trend was taking place. However, the enormously increased purchasing power, combined with low meat prices, which came during the post-war period restored meat consumption to a high level. At present it is not possible from a study of the figures to determine whether there is any general trend away from a meat diet.

Nevertheless, there has been a definite change in the type of meat consumed. Thirty years ago the beef consumption was in the neighborhood of 70 lb. per capita, and this has declined to nearly 50 lb. At the same time pork consumption has increased about 10 lb. per capita. Lamb and mutton have remained about the same, while veal consumption has about doubled.

It is probably idle to try to forecast future trends in meat consumption. Although it is one of the major food products, consumption of which is materially affected by price, we have seen the higher prices of recent years accompanied by continued high consumption, due to the high purchasing power and general prosperity that obtained. At the same time more efficient and cheaper methods of producing meats are coming into practice, and new methods of merchandising, such as the sale of packaged, quick-frozen meat, may have very important effects on the trend of consumption in future years.

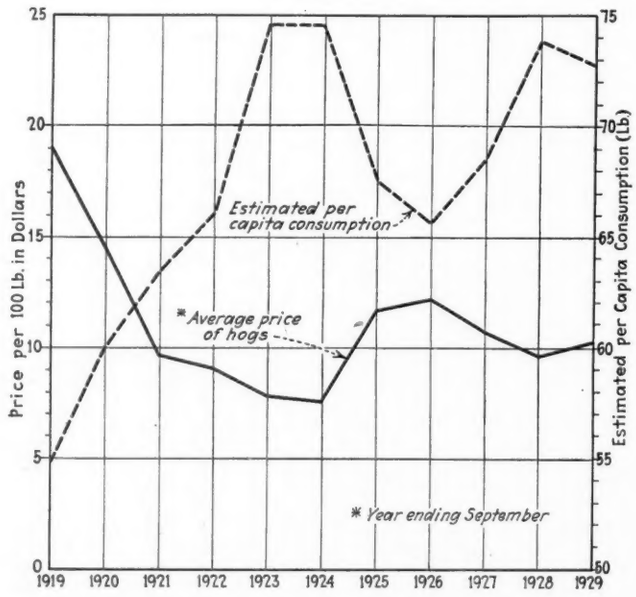

Price per 100 Lb. in Dollars
Estimated per Capita Consumption (Lb.)
Estimated per capita consumption
* Average price of hogs
* Year ending September
1919 1920 1921 1922 1923 1924 1925 1926 1927 1928 1929

Fig. 4—How hog prices have controlled the consumption of pork

Let There Be Light

Some Suggestions on Industrial Lighting Practice*

IF each worker should slip a blindfold over his eyes as he took his place in the plant some morning, the cause of impaired efficiency, lowered morale, increased accidents, and general plant slovenliness would be perfectly obvious. Something would be done, and done quickly, to eliminate such an idiotic practice.

The actual loss in dollars and cents does not end with the manifest lowering in worker efficiency. It is more than a mere coincidence that the words "bright and clean" are so often linked, for only by proper lighting is scrupulous cleanliness in any food plant made possible. Conversely, the value of scrupulous cleanliness, in its practical effect upon quality and in its psychological effect upon workers and visitors, is effective only when good lighting makes the cleanliness apparent. Then too, there are reliable figures to indicate that from 15 to 25 per cent of all industrial accidents are due to improper lighting. Adequate daylight is the ideal light.

The illumination intensity supplied by daylight should be at least four times the minimum specified for artificial lighting, because of the wide variation with time of day, weather, and season. Poor lighting usually results when the ratio between floor and window area is greater than 6 to 1. In most modern daylight factories, the ratio is between 5 to 1 and 3 to 1.

To avoid glare from direct sunlight, diffusing glass, suitable shades, or other means of obscuring the sun's direct rays should be installed wherever necessary. Of course, the best skylight or window is useless if covered with dust. A periodic cleaning schedule should be formulated and strictly carried out.

Even in plants where the natural lighting is far from ideal, well-designed artificial lighting can assure satisfactory illumination. As a matter of fact, artificial light is required in most plants about 20 per cent of the total working hours, excluding overtime or night work. Where night work is carried on, the artificial lighting problems must receive extra careful consideration.

Consultation with central-station engineers who specialize in illumination problems will be found valuable in determining the spacing of outlets, the size of lamps, and types of reflectors to be employed. The advantages of such counsel will be nullified, however, if the installation of proper outlets is considered as the whole problem.

The absorption of light by dust or dirt on reflectors and on wall surfaces is, in a great many cases, the cause of a good system rendering insufficient illumination for the kind of work performed. In the average shop where dust is present, the reflectors and lamp bulbs should be wiped off at least every two weeks and should be washed every four or five weeks. Care should be taken to see that dirty waste or greasy rags are not used for wiping, as this will leave a thin film of grease on the surface to which dust will readily adhere.

No factory manager would allow a machine, vital to daily production, to stand idle because of a mechanical failure. Neither should he allow a reflector to hang idle because of a burned-out lamp or empty socket. each reflector of a properly designed system has a particular area to illuminate, and if it is not working, that particular area is left with insufficient light.

In many industrial establishments where lighting is of vital importance to production, some special facility is used so that the equipment can be quickly and easily attended. Portable racks containing spare lamps, cleaning cloths, and lamp-renewal record cards, are often used. These may be assembled on a maintenance truck, equipped with a collapsible ladder and with clamping breaks or folding legs to prevent rolling while in use. At any rate, some reliable employee should be made responsible for the maintenance of the lighting system and should be given sufficient authority to enable him to get the work promptly and properly done.

The accompanying table shows desirable light intensities for various food plants. One foot-candle, the unit in which intensity is measured, is the amount of illumination produced at a point on a surface 1 ft. distant from a light source of 1 candlepower, the surface being at right angles to the light rays. Foot-candle meters are available to check existing conditions in the plant against the recommended lighting facilities.

	Foot-Candles Recommended	Foot-Candles Required (Minimum)
Bakeries	12	8
Candy Making	12	8
Canning and Preserving	12	8
Chemical Works		
Hand Furnaces, Boiling Tanks, Stationary Driers, Stationary or Gravity Crystallizing	5	3
Mechanical Furnaces, Generators and Stills, Mechanical Driers, Evaporators, Filtration, Mechanical Crystallizing, Bleaching	6	4
Tanks for Cooking, Extractors, Percolators, Nitrators, Electrolytic Cells	10	6
Dairy Products	12	8
Elevator—Freight and Passenger	8	5
Garage Automobiles		
Storage—		
Dead	3	2
Live	8	5
*Repair Dept. and Washing	15	10
Ice Making		
Engine and Compressor Room	10	6
Inspecting		
Rough	10	6
Medium	15	10
*Fine	25	15
*Extra Fine	†	..
Meat Packing		
Slaughtering	8	5
Cleaning, Cutting, Cooking, Grinding, Canning, Packing	12	8
Milling—Grain Foods		
Cleaning, Grinding and Rolling	8	5
Baking or Roasting	12	8
Flour Grading	25	15
Offices		
Private and General—		
Close Work	15	10
No Close Work	10	8
Drafting Room	25	15
Packing		
Crating	6	4
Boxing	10	6
Power Plants, Engine Rooms, Boilers		
Boilers, Coal and Ash Handling, Storage Battery Rooms	5	3
Auxiliary Equipment, Oil Switches and Transformers	8	5
Switchboard, Engines, Generators, Blowers, Compressors	10	6
Receiving and Shipping	6	4
Store and Stock Rooms		
Rough bulky material	3	2
Medium or fine material requiring care	8	5
Sugar Grading	25	15
Toilet and Wash Rooms	6	4
Warehouse	3	2

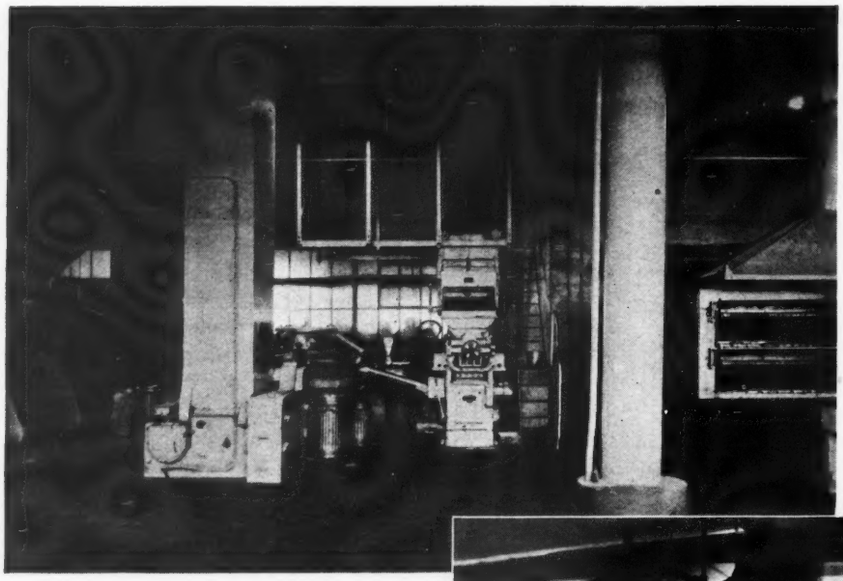
*In interiors marked with asterisk (*) other factors such as the direction of light, its color quality or the type of the fixture, are of unusual importance and require special study.

†In interiors marked with dagger (†) the level of illumination required is so high—usually 50 to 100 foot-candles, that individual lamps are ordinarily supplied for each operation in addition to a general room illumination of 10 foot-candles or more.

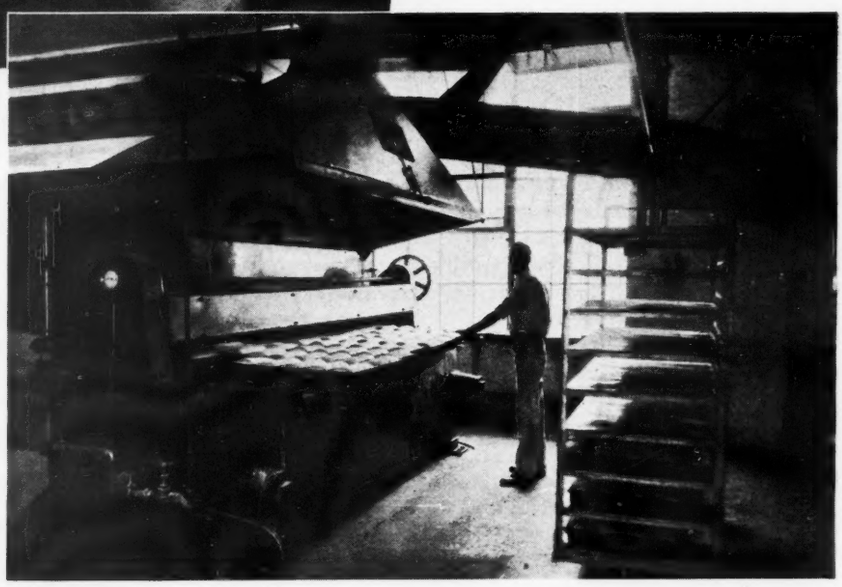
*For more complete information, refer to "Industrial Shop Lighting," Safe Practice Pamphlet No. 22, National Safety Council, Chicago, Ill.

ELECTRIC BAKING *Fr*

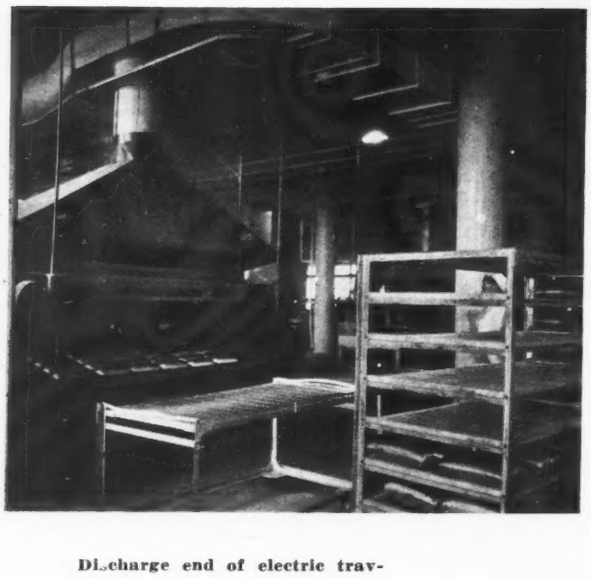
By EARL D. STEWART
Assistant Editor, Food Industries



Kneading room in the fully electrified bakery of Mutual Stores, Inc., of Oakland, Calif., showing electric oven



Receiving end of electric traveling oven which is fed with panned dough brought from the proof room by monorail conveyor



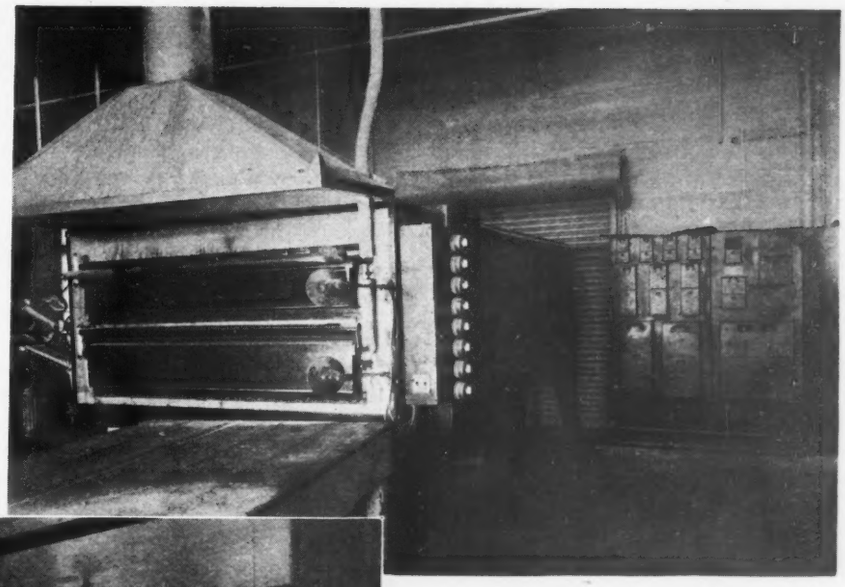
Discharge end of electric traveling oven, where bread is removed from pans and placed on mesh-bottomed carriers such as that shown in the foreground

EVEN THOUGH electrically heated process equipment is not new in food manufacturing plants, little information is available as to the economy of operation of such machines. Consider, for instance, such an electric oven as was described in FOOD INDUSTRIES for February, 1929, under the title "Electricity Applied to Bread Baking." Many in the industry would like to know just what cost per pound of bread baked is attained with this form of heat. Fortunately, some interesting figures have recently become available for an oven of similar type, though of somewhat smaller size. These figures are discussed in this article.

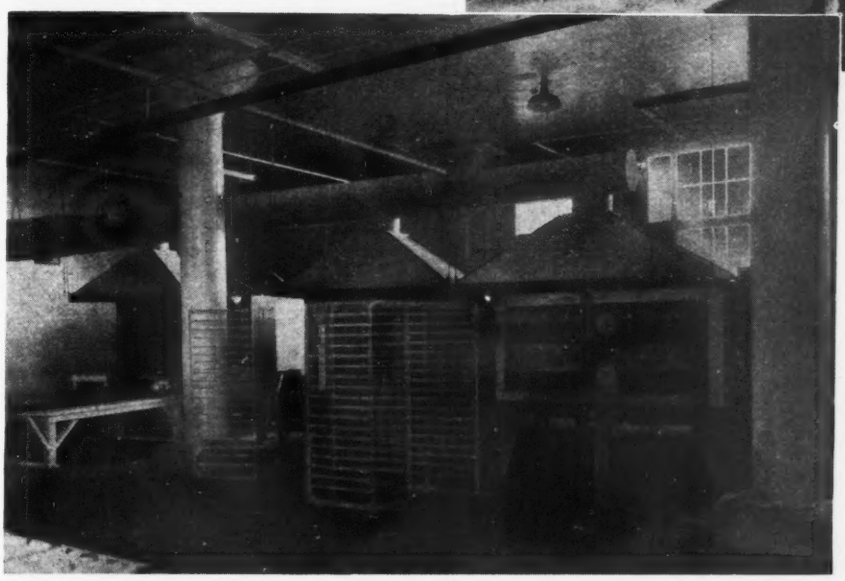
The oven is owned by Mutual Stores, Inc., Oakland, Calif., and was built by Baker-Perkins Company in May, 1928. It is equipped with General Electric heating elements and temperature control and with Brown electric pyrometers. The traveling plate is 60x9 ft. and is driven by a 5-hp. motor through a speed controller and reduction gear. Control of speed is electrical and the time of travel of the plate through the oven can be set on a dial, calibrated in minutes, situated on the wall near the discharge end. In the event of failure of electric lines the plate can be moved through the oven by hand and the bread thus saved.

Since the speed of the traveling plate as well as the

From the Economic Side



Electrically heated peel oven for baking special breads, with switch cabinet on side and control panel adjacent

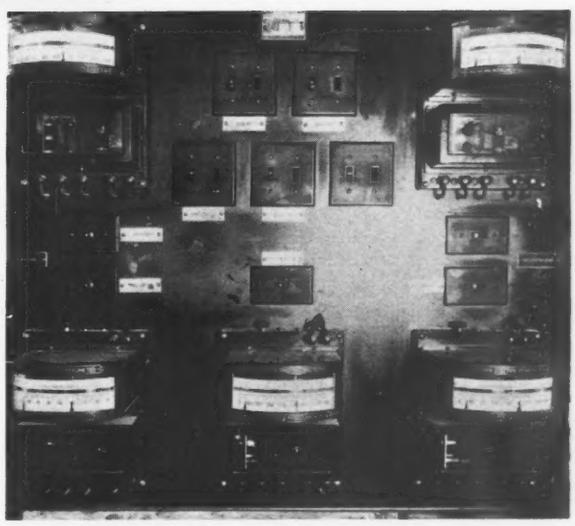


Small electrically heated pastry ovens. The temperature recorders can be seen mounted on the front of these ovens

temperature of the oven can be varied, it might be supposed that during rush periods the bread could be baked at somewhat higher temperatures, at faster speed of the plate. Such is not the case. To produce a high-quality loaf a compromise must be reached between temperature and time of baking. For example, with the most commonly baked bread, a white family loaf, the temperature in the top sections is 450 deg. F. and the bottom sections 540 deg. F., with a travel time of 30-32 minutes for a 1-lb. loaf and 36-37 minutes for a 1½-lb. loaf. Under these conditions, 3,000-3,600 lb. of bread an hour will be baked.

The heat is furnished by five sections of twelve heating units each. The heating elements are nickel-chromium ribbons 1¼ in. wide, supported on special insulators and connected, four units in series, in each of the three phases of a 220-volt, delta connected line. This gives 66 kw. a section or, for the total of 60 heaters in the five sections, a connected load of 330 kw. The heaters operate at low watt density and do not become red when operating at oven temperature.

No heating units have been replaced since the oven was built, fifteen months ago at this writing. Each of the five sections of heaters is automatically and independently controlled. By running two wires from each



Electric control and switch panel for electric traveling bread oven, showing the indicating pyrometers and temperature regulators

phase of heaters to the control board, it is possible in the case of a ground or short-circuit on any phase to isolate it and still continue operating.

In connection with the automatic control panel, the temperature is regulated by the use of five indicating-type temperature controllers mounted on a separate panel near the loading end of the oven where the operator can watch conditions throughout the whole oven. The temperature is easily maintained wherever desired within the limits of the control instruments.

At present this oven is operating on two 8-hour shifts daily except Sunday. It has on several occasions operated 24 hours a day. Following an approximately three weeks heating-up period after building, the oven has been operated continuously. In that time there have been two periods aggregating a little over 2 hours when the electrical power was off from causes external to the plant operations. Following the Sunday shutdown the current is turned on about 3 hours before the first pans of dough are put in. In other words, the oven has never cooled off completely since it was built.

The advantages of the electric traveling-plate oven are many, according to A. E. Link, bakery superintendent. The bread is more thoroughly and evenly baked; has crisper, browner crusts; finer texture, stays fresh longer, and does not crumble. It is light and porous and not heavy or soggy. The heat control is simple and its ready flexibility gives the exact temperature for whatever bread is baked. The possibility of explosions is eliminated. It is cleaner, with no fumes or soot, and working conditions are more pleasant. Temperatures in the shop are never excessive. Also, less skilled labor is required for its operation. No oven-tender is required to see that all burners are lit and burning properly. The only manual operations are feeding in unbaked dough and removing the baked loaves.

The Mutual Stores bakeshop uses electric heat exclusively in its ovens, of which there are four besides that described. This latter consumes about 85 per cent of the total oven load, which is in turn 63 per cent of the plant load. The data in the accompanying table gives a summary of power consumed and products baked from July 11 to Aug. 10, 1928. These figures indicate a power consumption of 97 kw.-hr. per thousand pounds of bread baked. Since these readings were taken the figure has been reduced to 89-91 kw.-hr. when operating on two 8-hour shifts daily and to about 82 kw.-hr. when operating on a 24-hour basis.

Power is purchased on a sliding scale that involves both maximum demand and the time of day during which the power is used. Owing to this and to the large motor horsepower installed, an exact figure for the heat-producing portion of the power is difficult to deduce. However, it can be estimated that 1c. per kilowatt-hour, or about 82 to 91c. per thousand pounds of bread, is a fair approximation. Before installation of electric ovens, oil-fired ovens were used, and with these the cost of heat was 60-70c. per thousand pounds of bread baked. Evidently, then, the cost for electric heat is about 20c. per thousand pounds higher. This additional cost is largely offset by the fact that the increased consumption of electric power throws more of it into the lower-cost brackets of the power company's schedule and hence decreases the average cost of power consumed by the motorized equipment in the plant.

It is true that power used in this bakeshop is mainly generated hydro-electrically, but it is safe to predict that any power company making steam-generated power would offer attractive rates if assured of a monthly consumption of, say, 85,000 kw.-hr., particularly if part could be used during the valley hours of the daily load curve. The National Tea Company, for example, has procured power rates in Minneapolis sufficiently low to warrant the installation of an electric baking oven.

Consumption of Electric Current at the Mutual Stores, Oakland, Calif.

Daily Readings, 8 A.M., July 11, 1928, to Aug. 10, 1928

Date 1928 July	Total Load Kw.-Hr. Reading		Maximum Demand Kw. Reading		Baker-Perkins Kw.-Hr. 330 Kw. Reading		Rainier No. 4 Kw.-Hr. 70 Kw. Reading		Ross No. 1 West Kw.-Hr. 50 Kw. Reading		Ross No. 2 Kw.-Hr. 50 Kw. Reading		Rainier No. 3 Kw.-Hr. 70 Kw. Reading		Total Load Ovens Kw.-Hr.	Total Lbs. of Bread Baked
10	.....	0428	604.8	42	.....	0033	....	0002	....	....	....	0003	....	0003	.....	40,253
11	.....	0435	604.8	42	.....	0052	240	0006	60	0001	180	0006	360	0009	5,400	40,714
12	8,400	0442	604.8	42	4,560	0072	180	0009	....	0001	240	0010	360	0015	5,580	45,611
13	8,400	0451	532.8	37	4,860	0095	240	0013	....	0001	300	0015	360	0021	6,420	75,373
14	10,800	0461	547.2	38	5,520	0124	240	0017	....	0001	360	0021	480	0029	8,040	43,183
Sunday 15	.....		.....		.....		.....		....		.....		.....		.....	.....
16*	12,000	0469	504.0	35	6,960	0148	180	0020	....	0001	240	0025	300	0034	6,480	39,247
17	9,600	0476	532.8	37	5,760	0162	300	0025	....	0001	300	0030	300	0039	4,260	41,371
18	8,400	0483	589.6	34	3,360	0180	240	0029	120	0001	180	0033	240	0043	4,980	38,056
19	8,400	0491	518.4	36	4,320	0202	240	0033	....	0003	360	0039	360	0049	6,360	45,145
20	9,600	0499	532.8	37	5,280	0224	240	0037	....	0003	240	0043	300	0054	6,060	76,364
Sunday 22	.....		.....		.....		.....		....		.....		.....		.....	.....
23*	13,200	0510	504.0	35	6,720	0252	300	0042	....	0003	240	0047	420	0061	7,680	43,472
24	8,400	0517	475.2	33	4,560	0271	240	0046	....	0003	300	0052	300	0066	5,400	36,210
25	8,400	0524	475.2	33	4,320	0289	240	0050	....	0003	240	0056	360	0072	5,160	38,925
26	8,400	0531	475.2	33	4,320	0307	180	0053	....	0003	180	0059	300	0077	4,980	37,853
27	8,400	0538	504.0	35	5,280	0329	240	0057	....	0003	300	0064	360	0083	6,180	46,682
28	10,800	0547	518.4	36	5,760	0353	240	0061	180	0006	180	0067	420	0090	6,780	76,242
Sunday 29	.....		.....		.....		.....		....		.....		.....		.....	.....
30*	13,200	0558	547.2	38	6,720	0381	360	0067	60	0007	420	0074	360	0096	7,920	43,982
31	8,400	0565	504.0	35	4,560	0400	240	0071	60	0008	180	0077	360	0102	5,400	40,161
Aug. 1	8,400	0572	475.2	33	4,800	0420	300	0076	....	0008	180	0080	300	0107	5,580	42,150
2	9,600	0580	489.6	34	4,800	0440	240	0080	....	0008	240	0084	360	0113	5,640	42,136
3	9,600	0588	504.0	35	5,520	0463	240	0084	300	0013	240	0088	300	0118	6,600	51,184
4	9,600	0596	576.0	40	5,280	0485	240	0088	60	0014	300	0093	360	0124	6,240	76,532
Sunday 5	.....		.....		.....		.....		....		.....		.....		.....	.....
6*	14,400	0608	532.8	37	7,440	0516	420	0095	....	0014	420	0100	420	0131	8,700	39,435
7	8,400	0615	532.8	37	4,560	0535	240	0099	....	0014	180	0103	360	0137	5,340	40,708
8	9,600	0623	489.6	34	4,800	0555	300	0104	....	0014	300	0108	360	0143	5,760	40,581
9	8,400	0630	504.0	35	4,800	0575	240	0108	....	0014	180	0111	300	0148	5,520	43,053
10	9,600	0638	518.4	36	5,520	0598	180	0111	....	0014	240	0115	300	0153	6,240	57,665
11	.....	....	.....	...	.....	....	....	....	....	....	....	....	....	....	.....	78,474
....	.....	....	.....	...	.....	....	....	....	....	....	....	....	....	....	.....	.....
Totals....	252,000		604.8 max.		135,600		6,540		840		6,720		9,000		158,700	1,399,855

Pastry Baked—4 Ovens Description	No. of Pieces
Pumpernickel.....	6,163
Sweet buns.....(Doz.)	3,684
Finger buns....(Doz.)	5,249
Parker House..(Doz.)	4,843
Cinnamon rls....(Doz.)	2,962
Poppy seed....(Doz.)	40
Snails.....	61,365
Butter horns.....	76,032
Bear claws.....	16,458
Wreaths.....	4,371
Danish pastry, 5c...	32,408
Danish pastry, 25c..	84
Fruit squares.....	355
Stevens squares....	23
Cinnamon squares..	87
Jelly squares.....	1,781
Butter squares.....	81
Rings.....	2,286
Jelly rolls.....	2,371
Chocolate rolls.....	2,251
Angel rolls.....	2,795
Muffins.....	260
Steven rolls.....	595
Loaf cake, sm.....	3,094
Loaf cake, lg.....	8,759
Sponge cake.....	1,053
Sheet cake.....	876
Mutual strips.....	1,127
Mutual wraps.....	1,656
Alma fruit.....	800
Turnovers.....	7,750
Cup cakes, spice....	5,257
2 layer-sq.-6 in.....	5,710
2 layer-sq.-7 in.....	1,820
2 layer-sq.-8 in.....	210
2 layer round 7 in....	3,011
2 layer round 8 in....	6,445
2 layer round 8 in. (Dec.)	2,572
2 layer round 9 in....	23
Special layers.....	11,413
Total.....	288,120

*Two days' readings.
Estimated transformer losses at 38.9% load = 4228.5 kw.-hr.
Transformer capacity kw.-hr. 30 days = 648,000.
Connected load kw.-hr. 30 days = 842,760.
Total load registered kw.-hr. 30 days = 252,000 = 38.9% of transformer capacity.
Maximum demand 604.8 kw. average demand = 350 kw.
Total oven load kw.-hr. 30 days = 158,700.

Estimated power and light load 30 days 93,300 kw.-hr.
63% of load-ovens.
85.5% consumed by Baker-Perkins ovens.
4.7% consumed by Ross ovens.
9.8% consumed by Rainier ovens.
Use of power in bread ovens—97 kw.-hr. per 1,000 lb. of bread.
Use of power in pastry ovens—23,100 kw.-hr.

TREATING CACAO BEANS

Lowers Chocolate Coating Cost

By GEORGE DEFREN
Consulting Chemist,
Newton, Mass.

THE MAIN reason for pressing cocoa butter from cacao beans or liquor is to supply the demand for cocoa butter required by chocolate coating manufacturers. The production of cocoa powder is incidental, at times a nuisance. When the supply exceeded the demand, cocoa cake has been hauled to the dumps, used in fertilizer mixtures, and burned under the boilers because there was no market for it. The absence of a market is not an uncommon situation.

So-called "breakfast cocoa" powder is a remnant from the days when primitive machinery was incapable of producing powder with a cocoa butter content lower than 22 per cent. Now that an international market has been created for cocoa powder containing this large percentage of fat, it is natural that strenuous efforts should be made to maintain that high specification; for a general standard at least. However, the writer some years ago demonstrated that the strongest flavored cocoa powder possible, per unit weight, contains no cocoa butter at all. Modern machinery is capable of pressing chocolate liquor so efficiently that only about 6 to 8 per cent cocoa butter remains in the press cake. On the other hand, there are cases where higher cocoa butter content is demanded, as where chocolate liquor containing all of the cocoa butter, say 54 per cent or more, is used to make chocolate drinks "rich," instead of using cream or high grade milk. Incidentally this looks like good business; cocoa butter is certainly cheaper than cow's butter or butterfat, at present prices. The relative digestibility of cocoa butter and cow's butter is a problem that is not a factor in our discussion.

In view of the fact that shell-free chocolate liquor containing from 50 to 58 per cent cocoa butter can be made from roasted cacao beans a logical question arises. Why should cocoa butter be so necessary to the manufacture of chocolate coating, especially if the production of this butter results in an unmarketable secondary product?

The question may be answered indirectly. Cake chocolate or chocolate coating contains from 28 to 34 per cent cocoa butter, sometimes considerably more. Even though chocolate liquor has far more cocoa butter than is necessary to make a coating, it is too bitter to be palatable. This characteristic is overcome by adding sugar to mask the natural bitterness of the cacao bean. To accomplish this purpose it is generally necessary to add so much powdered sugar to the liquor that the percentage of cocoa butter is reduced to a point where the mixture could not be handled for molding, covering, or dipping purposes unless cocoa butter also be added. Liquor made from a mild cacao bean requires less sugar to make an acceptable coating than does a rank, bitter bean, therefore little or no cocoa butter is needed. Blending of the mild, better flavored beans with rank, bitter beans, tends to mask the inferiorities of the bitter beans. The higher the percentage of the better flavored beans necessary to produce an acceptable liquor the greater the cost of the resulting liquor.

The writer has been able to remove the rankness of the bitter beans by a special treatment (patents issued and pending), in this manner raising the quality of the liquor. This process results in a lessened quantity of sugar, flavor beans, vanilla, and milk necessary to obtain an acceptable article for the reason that there is less bitterness to mask. Incidentally the cocoa butter content is raised in the nib or liquor, and the cost of the coating, per pound, is reduced in spite of the loss in weight due to the removal of the bitter constituents. The theory of this removal will be treated in a separate article.

Taking the cost of the raw beans, obtainable at present, at 8c., sugar at 4.7c., and cocoa butter at 23c. per pound, the cost of raw materials in actual commercial sized batches can be calculated on a basis of the resulting coatings which contain 34 per cent total cocoa butter. To produce 1,000 lb. of liquor containing 54.5 per cent cocoa butter from the previously mentioned type of beans, assuming a loss of 20 per cent in shell, moisture and volatile products, due to the roasting and winnowing of the beans, requires 1,000/0.8 or 1,250 lb. of beans. The composition and cost of the batch is shown below:

1,000 lb. liquor of 54.5 per cent cocoa butter, from 1,250 lb. raw beans	@ 8c. per pound =	$100.00
1,160 lb. sugar	@ 4.7c. per pound =	54.52
290 lb. cocoa butter	@ 23c. per pound =	66.70
2,450 lb. coating containing 34 per cent cocoa butter	=	$221.20

Thus one pound costs 9.08c.

By removing the rank bitter constituents to a degree where the liquor is decidedly milder in flavor, the cocoa butter of the liquor was raised to 58 per cent, less sugar was needed to make the coating, no flavor beans were added, the quantity of vanilla was cut in half, and no cocoa butter was added. When made correctly, the coating was unanimously classed as being much milder in flavor than that made from the untreated bean.

A greater weight of raw beans prior to treatment was needed to give 1,000 lb. of liquor, allowing the same 20 per cent loss during roasting and winnowing. In fact 1,330 lb. raw beans were necessary. The make-up of the batch is shown on the following page:

1,000 lb. liquor containing 58 per cent cocoa butter from 1,330 lb. raw beans @ 8c. per pound		$106.40
706 lb. sugar	@ 4.7c. per pound	33.18
1,706 lb. coating containing 34 per cent cocoa butter		$139.58

One pound of coating costs only 8.18c.

The costs of the products of both methods are exclusive of operating expenses. Extraction of the beans involves an added expense of 0.1 to 0.3c. per pound, depending on the type of equipment used in the extracting and drying treatment. This still leaves a margin of profit in addition to producing a milder flavored coating.

Due to the smaller amount of sugar and no added cocoa butter, the second coating was darker than the first. Had both batches been made of equal weight by the addition of sugar and cocoa butter on the 34 per cent cocoa butter content basis, the second would have been too sweet for most purposes, and would have been lighter in color.

The second coating was used to advantage as a base for high quality coatings. The quantity of the higher-priced, mild-flavored beans required by the regular formula was cut in half, in some cases even to one-fourth. This was possible because there was less rank bitter characteristics to offset or dilute. The coating, as made, was sufficiently sweet to meet the tastes of the consumers.

It should be noted that the 58 per cent liquor is not to be taken as a standard base. If the beans be sufficiently bitter, it may be necessary to raise the cocoa butter content to—let us say—60 per cent. It happens that the batch of beans used gave satisfactory results when they had been extracted to the point where the resulting liquor had 58 per cent cocoa butter. The writer simply points out the general application of the principle.

To summarize: It will be noted that the second batch of coating, as made, did not require the addition of cocoa butter as such. In other words, there was no cocoa powder as a byproduct. Not only was this coating made without the necessity of pressing for cocoa butter, but the product was actually cheaper per pound, and possessed better quality.

As now practiced, the production of cocoa butter from nibs or liquor is the main item; cocoa powder is the byproduct. Were the process of improving the quality of cocoa beans generally adopted, the situation would be reversed. Cocoa powder as demanded by the trade would be the main item; cocoa butter would become the byproduct.

To burn a valuable food product, such as cocoa powder, under the boilers; to send it to the dumps; or to use it in fertilizer mixtures certainly seems to be nothing short of an economic crime. There is no need of having a surplus of cocoa powder.

▼ ▼ ▼

Estimated Apparent Consumption of Principal Canned Vegetables

The following tables showing estimated apparent consumption of the principal canned vegetables in the United States have been compiled in the Foodstuffs Division of the Bureau of Foreign and Domestic Commerce at Washington, D.C.:

Table I—Estimated Apparent Consumption of Canned Tomatoes
(Cases of 24—No. 3 Cans)

Year	Stocks at Beginning of Year: Canners and Distributors	Stocks at Beginning of Year: In Bonded Import Warehouses	Production	Imports*	Total Available Supplies	Exports*	Stocks at End of Year: Canners and Distributors	Stocks at End of Year: In Bonded Import Warehouses	Apparent Total Consumption	Apparent per Capita Consumption (Cans)
1925	†	42,630	12,519,000§	1,725,476	14,287,105	102,610	†	96,200	14,088,000	2.9
1926	†	96,200	19,770,000§	1,613,579	21,479,779	142,463	†	51,660	21,286,000	4.4
1927	†	51,660	9,455,000§	1,887,097	11,393,757	124,131	‡	97,390	11,172,000	2.3
1928	9,009,728	97,390	8,538,582	1,818,276	19,463,976	110,328	5,557,137	81,000	13,716,000	2.7
1929	5,557,137	81,000	14,145,301	3,427,192	23,210,630	91,649	6,885,566	327,490	15,906,000	3.1

*Converted from pounds to cases of 24—No. 3 cans at 51 lb. to the case. †No figures available. ‡Figure not used because no beginning of year stocks were available for this year. §Figures for previous year's pack are used since greater part of pack in any year is consumed in the following one.

Table II—Estimated Apparent Consumption of Canned Peas
(Cases of 24—No. 2 Cans)

Year	Stocks at Beginning of Year	Production	Imports*	Total Available Supplies	Exports*	Stocks at End of Year	Apparent Total Consumption	Apparent per Capita Consumption (Cans)
1925	†	19,315,000‡	62,103	19,377,103	181,671	†	19,195,000	4.0
1926	†	17,816,000‡	66,418	17,882,418	144,968	†	17,738,000	3.6
1927	†	17,709,000‡	35,552	17,744,552	203,623	§	17,541,000	3.5
1928	11,504,565	17,943,436	39,626	29,487,627	216,236	10,859,554	18,412,000	3.7
1929	10,859,554	18,530,000	56,225	29,445,779	279,486	10,387,962	18,778,000	3.7

*Converted to cases of 24—No. 2's at 30 lb. to the case. †Figures not available. ‡Figures for previous year's pack are used since greater part of pack in any year is consumed in the following one. §Not used due to lack of beginning of year figure.

Table III—Estimated Apparent Consumption of Canned Corn
(Cases of 24—No. 2 Cans)

Year	Stocks at Beginning of Year	Production	Total Available Supplies	Exports*	Stocks at End of Year	Apparent Total Consumption	Apparent per Capita Consumption (Cans)
1925	†	12,131,000‡	12,131,000	204,200	†	11,927,000	2.5
1926	†	24,320,000‡	24,320,000	143,776	†	24,176,000	5.0
1927	†	19,069,000‡	19,069,000	167,222	§	18,902,000	3.8
1928	12,198,100	14,497,130	26,695,230	266,343	10,749,942	15,679,000	3.1
1929	10,749,942	17,486,744	28,236,686	278,874	11,486,754	16,471,000	3.3

*Converted to cases of 24—No. 2's at 30 lb. to the case. †Figures not available. ‡Figures for previous year's packs are used since greater part of pack in any year is consumed in the following one. §Not used due to lack of beginning of year figure.

Table IV—Estimated Apparent Consumption of Green and Wax Beans
(Cases of 24—No. 2 Cans)

Year	Production	Exports*	Apparent Total Consumption	Apparent per Capita Consumption (Cans)
1926	4,037,000	564,719	3,472,000	0.7
1927	4,676,767	497,467	4,179,000	0.8
1928	6,213,320	483,342	5,732,000	1.1
1929	8,528,957	264,307	8,265,000	1.6

*Converted to cases of 24—No. 2's at 29 lb. to the case.

By PERCY W. PUNNETT

and

WALTER H. EDDY

Teachers College,
Columbia University, New York City

Dr. Eddy testing coffee by the standardized cup test. The cup in front contains a coffee to be compared with coffee of known freshness in the other cups

What Flavor Measurement Reveals About KEEPING COFFEE FRESH

COFFEE FRESHNESS—that highly featured sales point—becomes amenable to technical control only when we know what "freshness" and "staleness" really are. The fact that staleness in coffee is more than the absence of freshness, that it is a distinct flavor in itself, has been used by Dr. Punnett and Dr. Eddy in developing a standard cup test which indicates numerically just how much "freshness" and "staleness" a coffee contains at any time after roasting. By using this method of comparison they have indicated how such changes may be controlled.

AN OUTSTANDING event in the marketing of coffee during the past year has been the appeal of the vendors on the basis of flavor control. Certain groups have specialized in getting the coffee quickly from roaster to consumer with a dating system to protect the public from staleness. Others have adopted vacuum packing to prevent staleness from developing in the packaged coffee. Both groups agree that ground, roasted coffee quickly loses aroma and acquires a stale flavor on exposure to air.

With a view to learning the behavior of the coffee and the factors which must be controlled to prevent loss of flavor and development of staleness, we have studied this problem for the past two years. When we began our work, we already had available the excellent report of Dr. S. C. Prescott, published in 1927 by the National Coffee Roasters' Association. We were particularly interested in that part of his observations that dealt with flavor and the effect of roasting. In fact, the following quotations from his report supplied both starting point and direction for our studies:

1. The quantity of carbon dioxide in roasted ground coffee is dependent upon the age of the sample; the older the coffee, the less the carbon dioxide content—that is, coffee tends to lose its occluded gas.
6. Exposing coffee to the air with a large amount of surface exposed results in the dissipation of the carbon dioxide.
13. The loss in carbon dioxide appears to be closely related to the loss of flavor, aroma, and general commercial quality.
14. Coffee retains its good quality longest in those containers which prevent loss of carbon dioxide.
16. Carbon dioxide in coffee is desirable from the standpoint of keeping quality and the retention of flavor and aroma. (Quoted from S. C. Prescott's Final Report on Coffee Research.)

Our first need was a method of measuring changes in coffee flavor, if possible, a quantitative measure which would permit comparisons at intervals somewhat widely

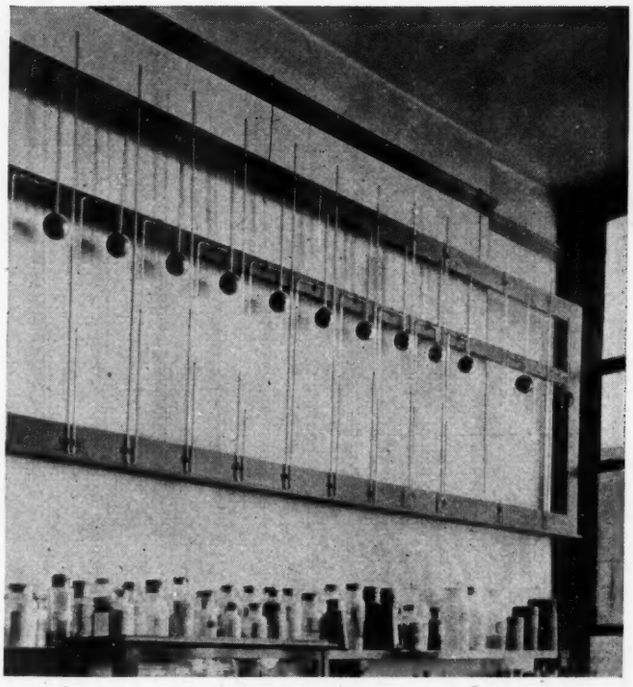
Table I—Standardized Method of Cup Testing

Cup No.	Grams of Freshly Roasted Coffee (For Comparing with an Obviously Fresh Coffee)	Grams of Freshly Roasted Coffee (For Comparing with an Obviously Stale Coffee)
1	8.0	4.0
2	7.2	3.2
3	6.4	2.4
4	5.6	1.6
5	4.8	0.8
6	4.0	...
7	3.2	...
8	2.4	...
9	1.6	...
10	0.8	...
11	Coffee of unknown freshness, 8.0 grams.	

apart in time. Coffee and tea tasting and testing is a matter that has for years been in the hands of trained "tasters." We obtained the services of Mr. J. C. McNulty, an expert in this field. Mr. McNulty and Dr. Punnett together developed a method of assaying coffee aroma and staleness which has not only made possible comparisons of coffee flavor over time intervals, but permits expression of these comparisons mathematically. At the same time the method can be used with a high degree of accuracy by untrained observers.

Two separate flavors are distinguished in coffee, depending upon its condition. One is the desirable coffee aroma and flavor, that we call "freshness"; the other is a stale flavor, or "staleness," that may later develop. These flavors can readily be distinguished by using different parts of the mouth for tasting—the back of the tongue for the coffee freshness and the sides of the tongue near the front for the staleness. Even if both are present at the same time, which may be the case in a coffee which is only slightly stale, the coffee freshness can be observed as described, especially when the beverage is as hot as bearable in the mouth. The staleness is better noted when the beverage has been cooled off considerably.

By treating these two flavors as independent variables, a standardized cup test was built up. Assume, for example, that the problem is to determine the flavor changes in a blend of coffee of known composition at weekly intervals following roasting and packing in a given type of container. On the selected test-date a fresh roast is made of the same blend as packed, matching the previous roast as closely as possible. After cooling and grinding, this roast is measured out into a series of cups. If the coffee to be tested is obviously quite fresh, 8.0 grams of the fresh roast is put in the first cup and the amount decreased by 0.8 grams in each succeeding cup. If the example to be tested is quite stale, we put only 4.0 grams of the fresh roast in the first cup and make a series decreasing successively by 0.8 gram per cup. In either case, a series differing by 10 per cent in coffee content is prepared, as shown in Table I.



Bank of tubes arranged to determine the amount of gases given off by coffee

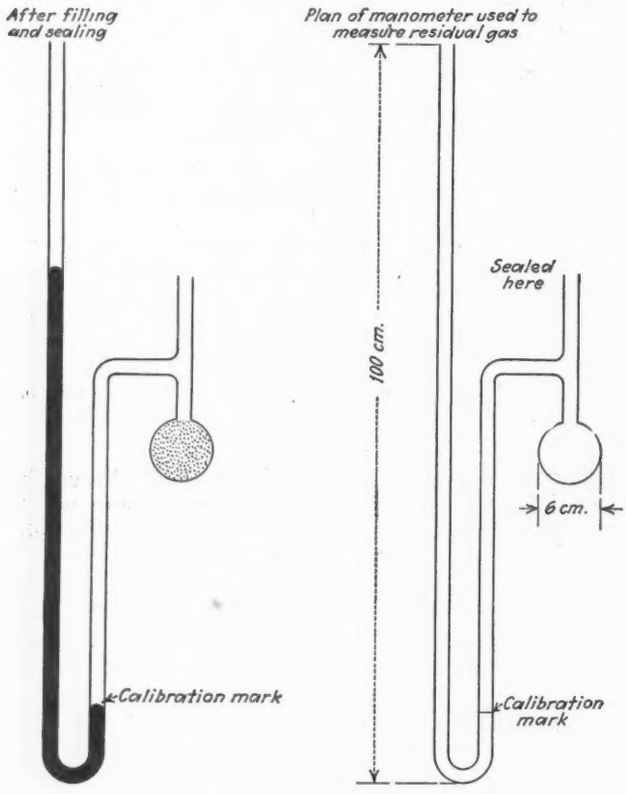
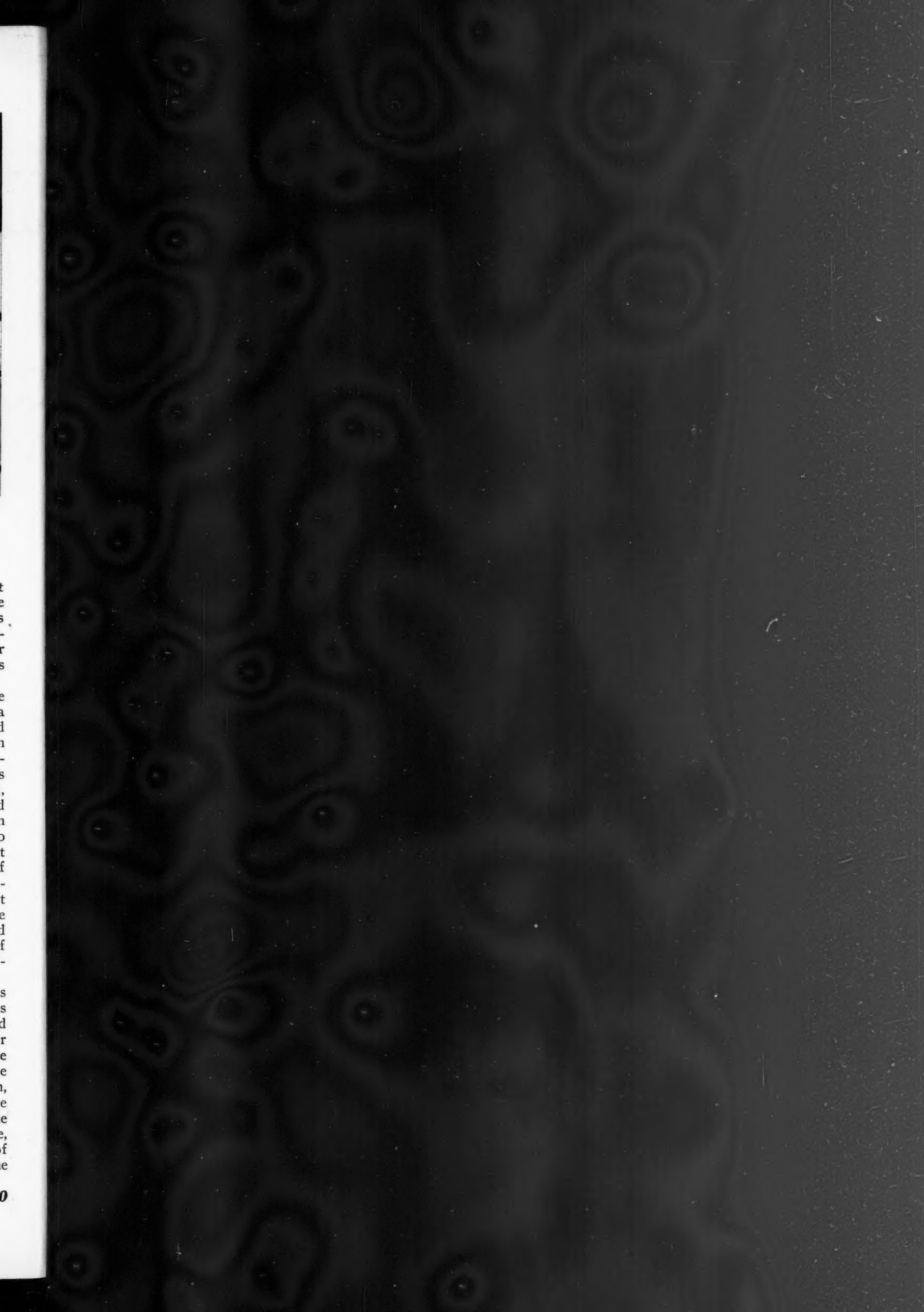


Fig. 1—Manometer tube used in correlating loss of gases with loss in flavor

An 8-gram sample of the stored coffee that is to be compared with the fresh roast is now weighed into a separate cup. Boiling water is then poured into all, and the sample of unknown freshness is compared with each of the standard series, first by smell and later, after cooling, by taste. The 8-gram sample of the fresh roast is the basis by which 100 per cent freshness is established, and the fractions down the series of cups can be reckoned in terms of percentage figures. The sample of unknown freshness is given a percentage rating corresponding to the cup in the standard series which it matches most closely in flavor. For instance, if the 8-gram sample of unknown freshness and the 6.4-gram fresh roasted sample appear identical in "freshness" flavor to the taster, it will be given a freshness value of 80 per cent. Practice has shown that intervals between cups can be estimated to differences of 2.5 per cent, or if desired, the range of standard cups can be extended by using 5 per cent differences.

If the sample exhibits "stale" flavor, another series of test cups is made up. In each of these cups is first put the amount of freshly roasted coffee found in the first series to match most closely the flavor of the sample, for instance 3.2 grams, for a coffee of 40 per cent freshness. Then, beginning with the first cup, successively increasing amounts (0.8 gram, 1.6 grams, 2.4 grams, etc.) of a thoroughly stale sample (100 per cent stale) of the same blend are added. The coffee to be tested is made up and compared as before, using an 8-gram sample. A numerical expression of "staleness" is obtained from the second test, so that the



Food Ind
2:401
Sept 1930

Ind & Eng
16:90
Nov 12-30

Indus M
26:353
May 30-31

complete designation of such a sample might be 40 per cent fresh + 10 per cent stale, or some similar value. The method of recording this test is illustrated in Tables II and III.

With the test now standardized we could turn our attention to the factors affecting loss of aroma or freshness. Numerous observers including Prescott[1, 2, 3] have noted that coffee, after roasting, gives off a mixture of gases, mainly CO_2 and CO.

Those engaged in the packing of roasted coffee in vacuum cans have always observed that such cans show little vacuum, and may even contain pressure, after they have stood for 1 or 2 weeks. In fact, few cans would withstand the pressure evolved by the gases from coffee unless a vacuum were drawn before the sealing. operation.

Following out Prescott's belief that the loss of these gases is a step in the loss of aroma or freshness, we decided to attempt to correlate rate of gas loss with loss of flavor. Accordingly, 2 kilograms of roasted coffee[4] (requiring about 2.4 kilograms of the green coffee) was prepared in 0.5 kilogram batches, ground to the fineness used in the ordinary domestic percolator, and thoroughly mixed. The color of our roast was what is known as "medium roast," and closely matches several market brands.

Manometer tubes were prepared (see Fig. 1) and 40 grams of this ground coffee placed in the bulbs of one of these tubes. Mercury was then placed in the manometer up to the calibration mark representing a volume of 121 c.c., which included the bulb, stem, and upper part of the shorter arm of the manometer. The tip of the stem was sealed off in a blast flame and the tube mounted on a rack on the wall of the room. As the gas evolved from the coffee it depressed the mercury in the near arm of the manometer. Before reading the difference in level, more mercury was added to the open arm until the lower level returned to the calibration mark. In this way the pressure was always read at constant volume.

Table II—Gas Pressures (in Millimeters of Mercury) From Roasted Ground Coffee Measured at Daily Intervals

No. Days After Roasting	Result of Cup Tests		Tube No. Corresponding to Days of Storage Before Testing											
	Per Cent of Freshness	Per Cent of Staleness	1	2	3	4	5	6	7	8	9	10	11	13	16
0	100														
1	100		0												
2	.....	.....	257	0											
3	80	.....			0										
4	50	.....	369	130	54	0									
5	45	.....					0								
6	40	.....	394	174	108	*	41	0							
7	40	.....	409	197	117	...	64	33	0						
8	40	.....	442	224	141	54	92	60	35	0					
9	35	10	452	241	162	76	105	70	51	25	0				
10	35	15	445	238	163	91	111	73	57	38	28	0			
11	35	20	447	238	162	98	111	76	59	41	36	17	0		
12	35	25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
13	35	30	438	235	164	102	111	73	57	41	41	25	9	0	
14	.....	.....	460	254	181	125	127	92	80	63	62	43	32	30	
15	35	40	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
16	35	75	452	251	175	127	127	89	79	63	63	48	41	35	0
17	.....	.....	441	241	168	119	119	83	68	57	55	38	25	22	13
19	35	80	445	245	172	124	121	86	73	60	60	43	29	25	6
20	35	80	456	254	184	132	132	95	83	71	71	55	41	38	5
21	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
23	35	80	468	267	191	141	141	103	92	79	79	64	46	44	11
26	30	80													

*Found to be leaking. Refilled with roasted coffee that had been exposed three days.

[1]Gould, 8th Int. Congress, App. Chem. 26,389 (1912).
[2]Shaw and Frederich, Analyst 51,308 (1926).
[3]Black, Analyst 51,403 (1926).
[4]In our tests we used the following blend: 5 parts Medillin Excelsa Bogota, 3 parts Natural Maracaibo, 10 parts Bourbon Santos 4's.

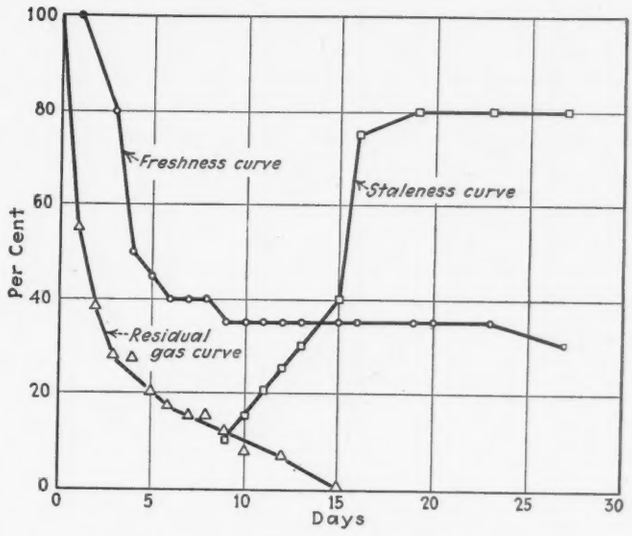


Fig. 2—How flavor changed with loss of gas

The remainder of this coffee was placed in shallow pans in layers of about 2.5 cm. and kept in a closet at room temperature. Twenty-four hours later a second tube was set up also with 40 grams of this coffee placed therein, a third at the end of 2 days, and so on up to 26 days.

Each day also, the coffee in the pans was tested by the standard cup method previously described against a freshly roasted sample of the same green blend. Table II shows the results of our findings.

The slight variations from day to day are due to room temperature changes, and the pressure in tube No. 16 is due to the difference in temperature between the floor level—where the tube was sealed off—and the upper wall, where the tubes were hung. If the pressures for the seventeenth, nineteenth and twenty-first days are corrected for the pressure due to temperature as shown in tube No. 16, the average may be assumed to represent more exactly the pressures due to the gas remaining in the coffee at the end of each period.

The meaning of these figures becomes clearer when we graph the results, as shown in Fig. 2. This shows only about 11 per cent of the gas remained when the coffee freshness reached fairly constant cup test value of 35 per cent at the end of 9 days. Note also that staleness first became apparent at this time. In the next 6 days (ninth and fifteenth) gas was evolved slowly, and in this period staleness increased at a fairly steady rate. After all the gas was gone the increase in staleness took place very rapidly up to a value of 80 per cent. During this period freshness varied little, but if the test had been made after 26 days, at longer intervals, the coffee flavor would probably have been found to decrease slowly parallel with the slow rise in staleness.

Table III—Results of Control Test

Days	Coffee Flavor (Per Cent)	Staleness (Per Cent)
0	100	0
2	90	0
3	85	0
5	55	0
6	50	0
9	45	15
10	45	20
11	45	25
13	40	30
15	35	50

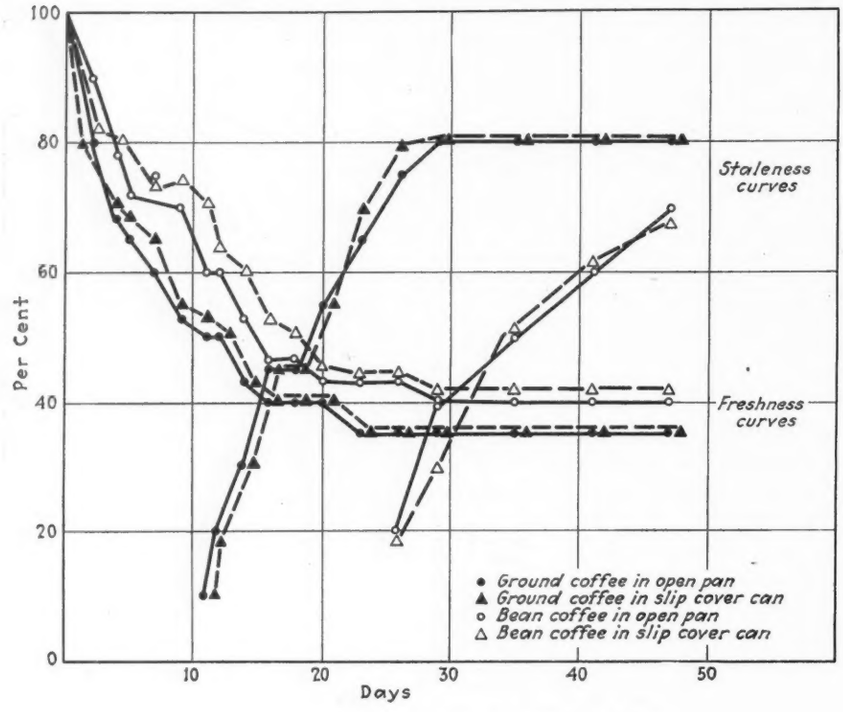


Fig. 3—Flavor changes in bean and ground coffee

As a control, we roasted another lot of this coffee on the tenth day of the above test, exposed it in pans as was done with the first lot and cup-tested it from day to day. Its behavior, as shown in Table III, closely paralleled that of the other sample, confirming the periods of development of flavor loss and increase in staleness.

These data confirm at least in a semi-quantitative manner Prescott's observations on the direct relation between loss of gas and coffee deterioration. The most probable explanation would seem to be that loss of freshness is mainly a volatilization process accelerated by the evolution of "roast" gases from the product.[5] Since the roast gas is mainly CO_2, it would also seem reasonable to believe that the "stale" taste is due to oxidation of the coffee oils, which of course does not begin so long as the gas is there to fend off the oxygen of the air. The roast gases, then, appear closely connected with flavor in loose coffee—preventing the access of oxygen to the coffee and indicating the degree of freshness.

It is a common observation that roasted coffee kept in the bean and ground only as needed is superior to stored ground coffee. We tested this point with both bean and ground coffee exposed in shallow pans and also packed in 1-lb. slip-cover cans. Table IV and Fig. 3 show the results of these tests.

Rate of freshness losses are not so different in the ground and bean coffees as was expected. The development of staleness, however, was definitely slower in the bean coffee. A significant comparison bearing on the packaging is shown by these tests for so far as they went the slip-covered can failed to prevent the escape of gases and flavor. Apparently such containers offer little hindrance to the exit of the "roast" gases.

A gas tight container, then, seems to be our only means of holding the flavor of roasted coffee over a considerable period of time. The high pressure exerted by the escaping gases makes a hermetically sealed container impractical unless it is much stronger than ordinary tin cans. Vacuum packing permits the use of ordinary tin plate by compensating for the inevitable pressure with an initial vacuum. Furthermore, it fulfills the second condition for the preservation of flavor by removing over 90 per cent of the oxygen which otherwise would be present in the can. It is one practical method for holding coffee without loss of flavor. Until another type of container is evolved of equal potency in gas retention, the only other protection against stale coffee seems to be close proximity of consumer and roasting plant, and the quickest possible distribution. Unless packed in hermetically sealed containers, coffee should be used up before it has a chance to lose freshness or acquire stale flavor.

Much remains to be studied in coffee behavior. Its chemical nature and the physiological effects of its infusions are still far from clearly defined. Much education is certainly necessary in the proper manner of making these infusions.

Table IV—Tests on Bean and Ground Coffee, Exposed And in Slip-Cover Cans

No. Days After Roasting	Ground Coffee				Bean Coffee			
	In Pans		In Slip-Cover Cans		In Pans		In Slip-Cover Cans	
	Per Cent of Freshness	Per Cent of Staleness	Per Cent of Freshness	Per Cent of Staleness	Per Cent of Freshness	Per Cent of Staleness	Per Cent of Freshness	Per Cent of Staleness
2	80	..	80	..	90	..	80	..
4	68	..	70	..	78	..	80	..
5	65	..	68	..	70	..	73	..
7	60	..	65	..	75	..	75	..
9	53	..	55	..	70	..	70	..
11	50	10	53	10	60	..	63	..
12	50	20	50	18	60	..	60	..
14	43	30	43	30	53	..	53	..
16	40	45	40	45	45	..	48	..
18	40	45	40	45	45	..	45	..
20	40	55	40	55	43	..	43	..
23	35	65	35	70	43	..	43	..
26	35	75	35	80	43	20	43	18
29	35	80	35	80	40	40	40	30
35	35	80	35	80	40	50	40	50
41	35	80	35	80	40	60	40	60
47	35	80	35	80	40	70	40	67

[5]Green coffee does not show occluded CO_2 or CO. These gases are apparently formed in roasting.

Mapping a Course for a Chemist In the Food Industries

By A. A. SCHAAL
Technical Bureau, Biscuit and Cracker Manufacturers Association, Minneapolis, Minn.

THOUGH chemists are not numerous in the baking field, they are finding increasing opportunities for service. More chemists are needed today but their success will depend perhaps on somewhat different qualifications than those demanded in other fields. The following remarks deal particularly with experiences in biscuit and cracker, and cake plants, though other types of plants might offer very similar problems. A paper of this kind must necessarily contain personal opinions, differing perhaps from others. We should all have a common purpose however, and that is to help the chemist make good in the baking industry; and suggest, perhaps with due apology, how the universities might do a little more to lower the fatality of young fellows well-trained in chemistry but unable to get under way out in the commercial field.

Chemists associated with biscuit and cracker plants should have first of all a good foundation in food chemistry, and certain chemical engineering subjects will be found very helpful. Far too often the chemist lacks the development that comes from liberal arts and business courses. Particularly is this true in connection with the "man to man" training that can be obtained to some extent in the university but that is too frequently considered insignificant by those who teach chemistry. The building up of desirable personality traits, along with a staunch character and a sound body, is fully as important to the baking chemist as to the college man in other fields; possibly, even more important. Nor is the university too early for instruction in the fundamentals of working under, with, and over men, principles that are not as intangible as many think.

When in college one is given his fill of chemistry and told that this is what he needs most now, and that later on ample opportunity will come to pick up the other, non-chemical qualifications that will help round him out. As a matter of fact the great majority of disappointments that come to chemists in baking plants are attributable to failure to deal with fellow workers, and not to any lack of chemical knowledge. Often the chemist pays too high a price for acquiring methods of co-operating, handling labor, and other training extraneous to chemistry, the grasp of which might have been given him when in school by his class advisor, or others peculiarly fitted to handle that important phase of his training. It is also unfortunate that the student chemist during his college years seems to have a lively dislike of such outside studies as foremanship, business organization, and others that ought to be taken to fill in the electives on the curriculum.

When the chemist enters the baking plant he must decide first of all whether or not he wants to make chemistry a profession or a stepping stone in the baking business. A very few large baking organizations with relatively large chemical staffs may afford to have men who consider chemistry as a profession. The baking industry in general wants chemistry used as a tool to make profits for the plant. It is difficult for a young chemist to understand that it is not degrading to chemistry to use it in such fashion. There is no better way for him to contribute to the profession at large than by being imbued with the spirit of baking better bread, better biscuits and crackers, and better cakes with the aid of such chemistry as is needed, rather than by building so pretentious a laboratory as to find difficulty in fitting it into the scheme of the plant. Baking plants cannot find enough chemists today who are willing to take this stand. Business consolidations in the years to come may cause us to modify this opinion but we are discussing here the chemist in the baking plant of today.

The initial work of the chemist in the baking plant will depend largely on the experience and plans of the man who is fostering his entrée into that plant. It is advantageous to have the chemist start with a small laboratory and then build it up around the plant problems. The laboratory should not be a separate department, but a part of the production department. A four or five thousand dollar investment in a laboratory for a young chemist is very apt to show red in the ledger account for too long a period, during which the chemist strives in vain to post his credits, because his training in college has not been aimed to make him show profits for his employer. Experience has shown also that a fully equipped laboratory set up for the chemist when he first enters the plant is apt to result in his living in that space too much of the day, running every determination on a shortening from the percentage of moisture to the iodine number. He should be out in the plant more of the time, seeing what determinations were really needed on that raw material. On the other hand the chemist needs isolated laboratory space with certain fundamental equipment. That laboratory, after all, contains the implements with which he has been accustomed to work and they must not be taken from him. They are valuable tools but only one set among several others which he must soon learn to use.

IT IS often very satisfactory for the manager of the biscuit plant to assign to the new chemist one or two definite tasks, preferably those which can be attacked promptly and efficiently by one with a chemical training. For example, the chemist might be given the responsibility of keeping in order all the balances and scales in the plant, or the job of making the invert sirup. Such early duties may take only a portion of his time but they give him an entrée into different departments that help him start the development of the good will and faith toward him, without which he cannot go far.

From the start the chemist must work in with the men and must be one of them. His progress will be all the faster if he rolls up his sleeves, feigns no knowledge he does not have, conceals that aristocracy which sometimes comes with a chemical training, and decides that he is a fellow laborer with the rest of the gang, worthy today of their respect as a worker under or with them, and tomorrow as their leader. The men in the plant respect the training which they know the chemist must have. The chemist in turn must respect that solid experience which comes to those who have toiled for years, perhaps at one machine. Here, one chemist will find a difficulty, and another will not. Some might explain it on the fact that the one chemist has simply not been properly trained or has not found time to sit down and think over the simple code of the man in working clothes. If I owe you an apology for recalling problems which you might say confront every chemist in industry, I can only say that they must be mentioned because all these things are integral parts of the adaptation of the chemist to industry.

Present building of the Mellon Institute

Solving

Food Manufacturing Problems

by Research Institute Method

By LAWRENCE W. BASS
Executive Assistant
Mellon Institute of Research
Pittsburgh, Pa.

PROGRESS in the science of foods has been achieved through the two large divisions of scientific investigation: pure research and applied research. No sharp distinction, however, exists between the two fields. The main difference, admittedly artificial, is in their aims; that is, pure research has as its goal the finding of new facts, whether they are of practical value or not, while applied science, or industrial research, is concerned with the adaptation of scientific findings to the needs of man. These two broad classes of research have worked hand in hand for the betterment of the human dietary, and we have innumerable examples of their mutual interdependence. The most striking instance is the evolution of the science of bacteriology through the labors of disinterested research workers—although Pasteur made many of his discoveries in the course of the solution of practical problems—and the application of this new branch of knowledge to food problems by applied scientists. Continued advance in the field of nutrition can come only through the simultaneous growth of the two types of investigation.

Food, or bromatologic, research has always been actively represented in the investigational program of Mellon Institute. At the present time, 7 of the 61 industrial fellowships—those on carbonated beverages, cooking utensils, edible gelatine, food containers, food varieties, milk products, and yeast—are concerned directly with what we eat. In addition, 4 more fellowships have to do with related problems: the can fellowship, the dental fellowship, the fertilizer fellowship, and the insecticide fellowship, which is developing new means of ridding our homes of pests that may contaminate our foods. Eighteen industrial fellows and fellowship assistants, out of a total of 143 research workers in the Institute, are assigned to these 11 fellowships.

Baking Fellowship (1908-10)—An investigation of the chemistry of baking was established by the National Association of Master Bakers under Dr. Robert Kennedy Duncan's direction at the University of Kansas, where the industrial fellowship procedure was first applied. This research, carried out by H. A. Kohman, was concerned chiefly with the technology of salt-rising bread. It was commonly thought at that time that a wild yeast was the essential organism in this type of dough, but Kohman proved that the rising was due to a certain type of bacteria. In addition, this research resulted in the development of standardized methods to yield a product of uniform quality.

Subsequently, through an arrangement with the interests concerned, Kohman acquired the rights to this discovery, which has been commercialized and is now used by bakers throughout the country. Salt-rising bread has a caseous or cheese-like flavor that appeals to many people, especially in the Middle West, the stronghold of "salt-risin' " bread.

Bread Fellowships (1911-25); Yeast Fellowship (1925-——)—On the completion of his studies on the baking fellowship, Kohman became the incumbent of the bread fellowship at Mellon Institute in Pittsburgh; the work was established through the vision of one of America's most progressive bakers, George S. Ward. As a result of this investigation, came "Arkady" yeast food, a preparation of inorganic salts to be used in dough mixtures. This product effected important economies in bakeries, gave greater control over dough batches, conserved the strength and stability of the dough, and improved the quality, flavor, texture, bloom, and uniformity of the finished loaves. The savings in the baking industry effected by "Arkady" were estimated in an editorial in the *Journal of Industrial and Engineering Chemistry* for March, 1922, as not less than $40,000 per day. The use of the product has greatly increased since that date.

Citrus Products Fellowship (1911-13)—This investigation, carried out by F. A. McDermott, was concerned with general problems on the utilization of byproducts of the citrus fruit industry, especially in regard to cull fruits as raw material for extract manufacture. The work was supported by an association of citrus fruit growers. McDermott gave attention to the production of calcium citrate; the conversion of this salt into citric acid; the preparation of concentrates and dried powders from juice; the preservation of juice in storage, as, for example, by the use of inert gases; and the preparation of essential oils from citrus peels. McDermott's monograph on his work was published as a bulletin of the Florida Agricultural Experiment Station, Gainesville, Fla.

Food Packing Fellowship (1912-14)—This research was conducted by C. C. Vogt and Mrs. Vogt, also a holder of the Ph.D. degree. It was largely concerned with procedures for the most effective packing of sliced bacon, vegetables, and fruits.

Fat Fellowships (1912-16)—This work on fat technology was carried out by L. M. Liddle, B. H. Nicolet, and E. O. Rhodes. One aspect had to do with the hydrogenation of various vegetable and animal oils to convert them into foods. This particular research was concerned with ascertaining the best conditions for effecting the conversion of oils into solid foods, such as butter substitutes and successors for lard. Strictly physical methods, for example, the incorporation of fats into oils, were also applied to such procedures.

Yeast Fellowship (1913-21) The work of F. A. McDermott, a biochemist, on problems of yeast technology, pertaining chiefly to the experimental study of yeast foods for the purpose of effecting economies in the production of yeast on a large scale. This investigation laid the foundation for a vast amount of subsequent study of the same subject in the Institute. Following this biochemical work, the investigation was extended into the fields of bacteriology and plant physiology, and many new discoveries made concerning yeast nutrients were later applied in practice.

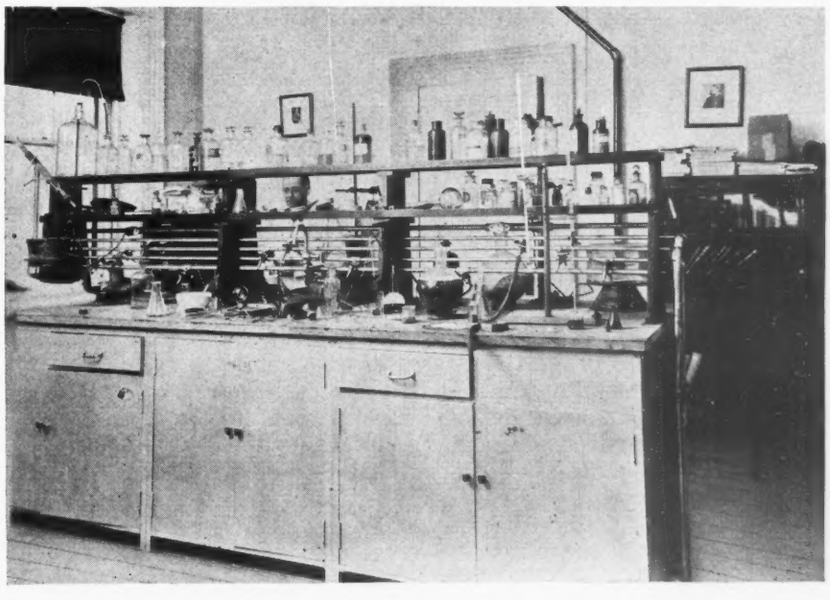
Peas Fellowship (1915-17)—For two years, E. H. Taylor carried on an investigation for the purpose of learning the most satisfactory conditions of packing to insure uniformity of the best type of canned peas.

Coffee Fellowship (1916-20)—The problem set C. W. Trigg, the incumbent of this fellowship, was the preparation of a dry, keepable, and otherwise efficient and properly flavored coffee concentrate in water-soluble form. He developed three patented processes, one of which was put into commercial use. The extract prepared by this method was satisfactory for marketing, as judged by the standards of the donor.

Further research on coffee was carried out by Roy Irvin (1924-28). His studies involved the broad consideration of the effects on health of coffee drinking by children and by the aged. This work, in which Irvin made the strictly chemical and nutritional studies and medical specialists provided the opinions of hygienic nature, led to the publication of reports in medical journals, which demonstrated clearly that coffee, tea, and other caffeinic beverages should not have a place in the diet of the young and the aged. Irvin's researches brought out plainly that milk, and not substitutes therefor, should be the important table beverage of the young. Irvin is now at work in the Institute on certain problems of dairy technology.

Food Container Fellowship (1916-26, 1929-——)—One of the most striking and interesting problems of the Institute was the working out of a procedure for the manufacture of artificial sausage casings. This investigation, which required ten years for successful solution of all points involved, first bore practical fruit in 1926, when the process was installed in the donor's plant. "Cotton shirts for wieners" are now being manufactured at the rate of 100 miles of seamless tubing per day. A full description of the process has been published by W. F. Henderson and H. E. Dietrich, who carried out much of the work (*Food Industries,* 1929).

The study involved all aspects of the highest type of



An organic chemical research laboratory, Building No. 2, Mellon Institute of Industrial Research. This room is in the suite of the department of research in pure chemistry, whose head is Dr. Leonard H. Cretcher

industrial research. First a hygienic and economic survey of possible raw materials was carried out. After the viscose process of artificial silk manufacture had been decided upon as the basic procedure, it was necessary to adapt the method to this particular end. Because of the novelty of this new application, a fundamental study of all steps was required. Then it was necessary to carry out the work in a non-continuous pilot plant and subsequently on the continuous semi-plant scale. The constant faith of the donor, E. O. Freund, in the ultimate success of the investigation was an inspiration to the workers on this problem.

The artificial casings are, of course, edible. They do not, however, stick to the sausage, and they can therefore be removed rapidly by hand to give skinless frankfurters.

Fruit Juice Fellowship (1916-18)—After the initial investigation of citrus fruit products by McDermott, R. R. Shively made a broad study of procedures that gave promise of success in preserving orange juice. For example, it was thought possible that certain gases might be of value to destroy enzymes that caused malflavor during storage. The project was only partly successful, because suspended matter began to settle out after a time. Subsequently, it was found that one of the most practical ways was by spray drying or other means of producing a powder. Thickening by use of a sugar of low sweetening value or by a fruit gum also offered possibilities. Both procedures finally came into practical use.

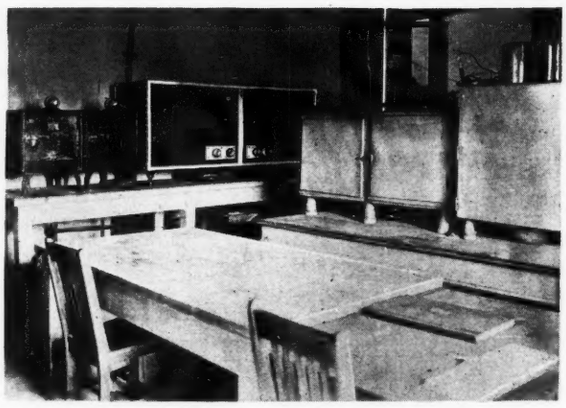
The laboratory in which W. F. Henderson (shown in the picture) and H. E. Dietrich evolved the process of making cellulose hydrate seamless tubing for food containers

The scientific information used in many subsequent studies conducted elsewhere came from the basic investigations carried out at Mellon Institute.

Canning Fellowship (1918-19)—A one-year investigation supported by an association of canning interests was concerned with the working out of improvements in canning processes and with the utilization of canning wastes. The fellowship was headed by M. R. Daughters.

Fruit Beverages Fellowship (1919-22)—Work was carried out on this project by H. A. Noyes, an agricultural chemist, who was soon transferred to the factory of the donor, a prominent manufacturer of grape juice. The study was first on production problems, and many important points in manufacturing were cleared up. Subsequent research was on various agricultural factors, such as soil conditions, and their effects on grapes.

Fish Products Fellowship (1920-22)—This research



A view in the laboratory of the yeast fellowship at the Mellon Institute

project was concerned with the technology of fish glue. In the course of the work, however, D. K. Tressler, an authority on ichthyochemistry who came to the Institute from the U. S. Bureau of Fisheries, prepared a treatise entitled "Marine Products of Commerce," in which considerable space was devoted to sea foods. Later Tressler published a popular abridgment, "The Wealth of the Sea."

Food Varieties Fellowship (1921- —)—This fellowship, held by E. R. Harding, has succeeded in developing two new breakfast foods. The merits of these foods having been demonstrated by laboratory work, supplemented by wide preference tests, processes for their manufacture were worked out collaboratively. They are both being made on a commercial scale by the donor. Harding also has carried out very extensive vitamin studies.

Emulsion Flavors Fellowship (1922-23)—This fellowship was founded by a prominent manufacturer of glycerine who, following the enforcement of the Eighteenth Amendment and the consequent restrictions on the use of industrial alcohol, thought that glycerine might be a good vehicle for certain flavors in the food and beverage industry. The work was carried out by Melvin DeGroote, who published a number of papers based on his experimental findings. In the course of his study, he saw opportunities for research on emulsion flavors—that is, simpler preparations than glycerine solutions, using permanent suspensions of flavors in water. Many flavors have their bouquet and delicacy affected when suspended in water, and grain alcohol is, therefore, still preferred.

Edible Gelatine Investigations (1923- —)—In the course of a study of glue technology, R. H. Bogue became interested in the general aspects of the field; he published a widely known technical book, "Chemistry and Technology of Gelatine and Glue," as one of the Mellon Institute Technochemical Series.

A fellowship was supported in 1923-25 by an association of gelatine manufacturers. T. B. Downey, the fellow, made comprehensive studies of the nutritive value of gelatine, and published his results in the scientific literature. Downey was particularly interested in the use of gelatine in ice cream.

Another fellowship, supported by an individual company, was in operation during the period 1925-28. A. M. Neff continued the studies on nutritional aspects of gelatine. His chief aims were to develop uses for gelatine in the home and to fix the status of this protein

in medicine, the latter work being carried out in co-operation with medical specialists. In collaboration with the staff of a pediatric hospital, for example, it was shown that gelatine can be used to advantage in many cases of infant feeding.

A third gelatine investigation has been in operation since 1926. W. W. Duecker, the fellowship incumbent, is studying the use of gelatine in food products, especially in the confectionery and biscuit industries. Most of his results have been published.

Vitamin Fellowship (1924-25) — On this project G. G. Naudain worked on the feasibility of vitaminizing butter substitutes from animal and vegetable sources. Many economic aspects of the problem received his attention, and he cleared up a number of questions in regard to sources. The processes, however, were too expensive for commercial application. Irradiation has since been shown to give antirachitic properties. Shortly after the completion of Naudain's study, a company in Norway began the practical use of a method similar in principle to that worked out by him.

Carbonated Beverage Fellowship (1927- ——)—This fellowship, held successively by C. E. McKelvey and R. F. Beard, has made important advances in the technology of this industry. A notable development to which it has contributed is the establishment of a method of extract manufacture, important alike in economy of solvent consumption and efficiency of extraction.

Cooking Utensil Fellowship (1926- ——)—This multiple industrial fellowship, headed successively by E. W. Schwartze and G. J. Cox, has obtained important results on the action upon utensil materials of foods cooked in them; the work has shown that the corrosion of cooking utensils during cooking operations is insignificant in degree and does not contribute in any way to food poisoning or other diseases.

Aluminum cooking utensils have no selective destructive action on the antiscorbutic vitamin of milk, according to the results of experiments carried out by this fellowship. Milk, man's most nearly perfect food, has particular importance in the dietary of the infant and child. There has been a growing tendency to boil milk whenever it is to be used in supplemental feedings, or whenever a supply is of doubtful origin. In thus safeguarding the health of children and in providing for better assimilation of the proteins, mothers may be assured that when they use aluminum utensils for the preparation of milk they are not depriving this invaluable foodstuff of its antiscorbutic properties.

In these experiments milk was boiled lightly for five minutes in aluminum or glass containers. Some destruction of vitamin C occurred in each case as a result of the boiling, but the metallic utensils exerted no greater action than did those of glass. Another interesting observation is that winter milk from ensilage-fed cows is practically as potent in vitamin C as the best summer milk from cows on pasturage. It was shown also that the amount of aluminum contributed to Pittsburgh tap water and fresh milk upon boiling in an aluminum vessel is practically nil, being 0.1 to 0.4 parts per million.

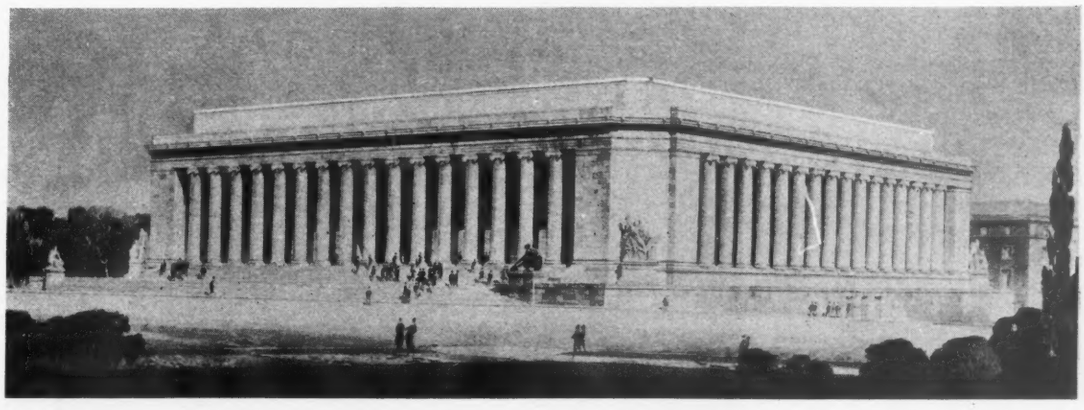
Relevant Extramural Activities of the Institute—In the course of this description of food research at the Institute, mention has been made of various projects carried on in co-operation with outside agencies. Such extensions of the work have been frequent, in food research particularly, but in other fields as well. In each instance the policy has been to select an institution with the best facilities for the particular problem.

Whenever medical collaboration has been indicated as necessary, it has been possible to make arrangements for the required studies at well-equipped hospitals and medical schools, while the collateral chemical problems have been carried out at the Institute. Such a procedure was adopted, for example, in the studies on edible gelatine and coffee.

Another aspect of these extramural activities is illustrated by the iodine fellowship, headed by G. M. Karns, which has as its basic object the investigation of possible technologic uses of this element. Recently the fellowship has expanded its activities by arranging for a study at the Pennsylvania State College, which has excellent facilities for this type of work, of the nutritional functions and value of iodine in the feeding of livestock. This broad project, which is under the direction of Prof. E. B. Forbes, of the Institute of Animal Nutrition, will include studies on cattle, sheep, and swine. Information of this nature is greatly needed, because the vast majority of research on the rôle of iodine in metabolism, especially in regard to the thyroid, has been limited to man.

Still a third type of extramural co-operation is carried on in the form of preference tests for various food products. An important step before developing the manufacture of such commodities to full commercial scale consists in determining whether or not they appeal to the average taste. These studies are most satisfactorily conducted in institutions, such as orphanages, for the reason that statistical material can best be collected from an organized group.

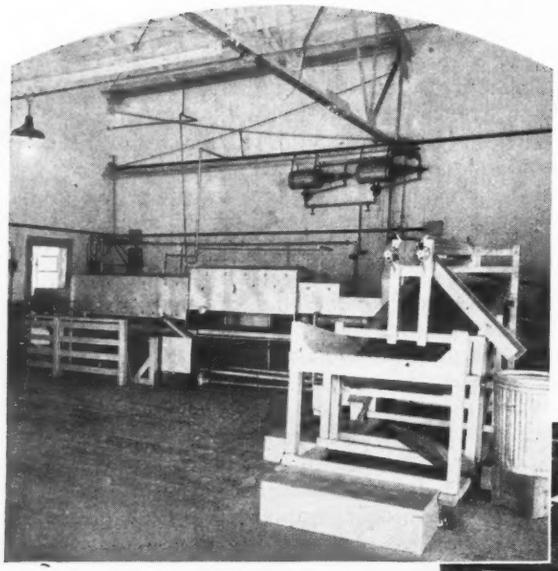
New home of the Mellon Institute of Industrial Research, soon to be built in Pittsburgh on the site of the present Building No. 2



FREEZING PEACHES

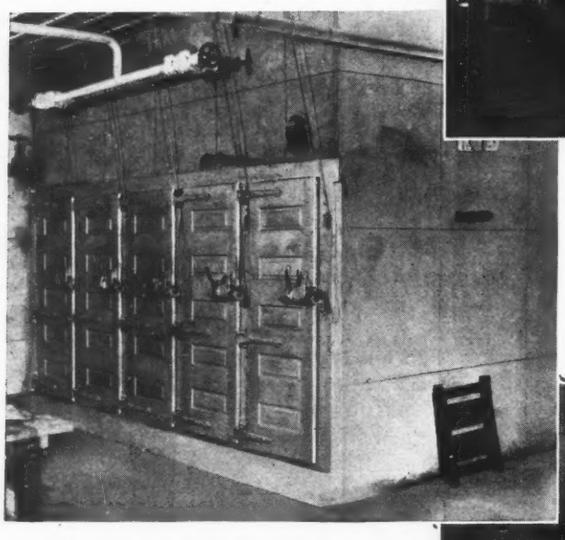
For Table Use

At the Plant of Tom Huston Frozen Foods, Inc.
Montezuma, Ga.

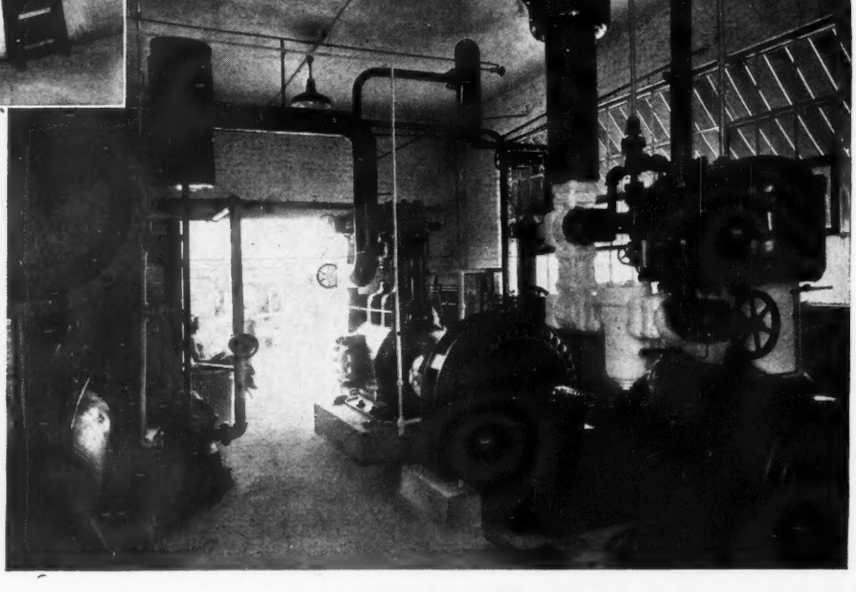


Tree-ripened Georgia peaches are brought to the plant in field crates by truck or freight car. From the unloading platform, they pass through the grading and peeling tank shown above, and then go through the wall opening to the processing room

At the tables in the foreground, the peaches are split and pitted by hand. In the background are the mechanical slicer and the apparatus by which the waxed cardboard cartons are filled, topped and sealed



Entrance to the freezing tunnels, where air at —35 deg. F. rapidly freezes the peaches. They are then stored at 10 deg. F. until shipment



By combining an 80-ton ammonia refrigeration system with a 45-ton carbon dioxide system, adequate refrigeration is obtained economically. Air for the drying tunnels is cooled by being blown over the CO_2 coils

The Copper Content of Beef and Hog Tissue*

By A. H. HELLWIG
Iowa State College, Ames, Iowa
and
G. N. QUAM
Long Island University, Brooklyn, N. Y.

MANY contributions have been made to technical literature on the subject of the copper content of animal tissues (see the appended bibliography, references 1 to 7). In most cases, however, the data given concerning any one animal has been meager. In some instances the number of samples of a given tissue analyzed has been so limited that the value of the data might be seriously questioned. The data presented in the accompanying table were determined largely from samples generously made available by T. M. Sinclair & Company, Cedar Rapids, Iowa.

In determining these data analyses were made on 50-gram samples of the fresh material. The tissues were reduced to ashes in the presence of calcium carbonate which was added to overcome the tendency to fuse. Precautions were taken to avoid contamination by copper and to control the process of analysis. The xanthate method (see bibliography, 8) was adapted to the conditions of the determinations. Other methods investigated showed no distinct advantages.

The accompanying table gives the copper content of tissues in terms of milligrams per kilogram of fresh material, the number of animals involved and the number of samples analyzed for each tissue.

The copper content of liver, both beef and hog, is 6 to 7 times as great as that of any other tissues analyzed. The variations were especially noticeable in the case of the livers of the animals. A knowledge of the copper content of the foods and "stock foods" fed the animals might serve to explain these wide variations, at least in part. This is an intimation that in such studies as this access can not be had to all the data desirable. As a result, conclusions must be drawn with caution, if at all. Not only should each organ of the animal be analyzed, but each part of an organ having a specific function should be studied separately. The authors realize that the data here given was incomplete in themselves; the work will be made to include other domestic animals.

Copper Content of Some Animal Tissues

Animal	Tissue	Number of Animals	Number of Samples	Ave. Mg per Kg.
Beef	Liver	3	6	16.0
	Kidney	2	7	2.4
	Heart	2	7	2.3
	Cartilage	1	2	2.2
	Lung	2	8	1.9
	Spleen	2	6	1.8
	Bone	1	2	1.75
	Brain	2	7	1.7
	Muscle	3	7	1.6
	Bile	2	8	1.3
	Pancreas	3	11	1.3
	Blood	1	3	1.3
	Tongue	2	4	1.2
	Tallow	2	5	1.0
	Eyes	3	5	0.85
Hog	Liver	6	19	14.5
	Bile	4	5	2.6
	Kidney	3	9	2.52
	Heart	3	7	2.11
	Brain	5	10	1.97
	Spleen	4	6	1.69
	Lung	4	6	1.64
	Tongue	3	8	1.54
	Bone	1	2	1.32
	Pancreas	2	4	1.17
	Blood	2	2	1.1

*An abstract of a major honors thesis, presented at Coe College, Cedar Rapids, Iowa, June, 1929.

BIBLIOGRAPHY
1. McHargue, J. S., Amer. J. Physiol. 72, 583 (1925; J. Agri. Res. 30, 193 (1925).
2. Warburg, O., and Krebs, H. A., Biochem. Z. 190, 143 (1927).
3. Titze, C., and Wedemann, W., Arb. k. G's'nd'htsamte, 38, 125 (1911).
4. Van Itallie, L., and Van Eck, J. J., Pharm. Weekbl. 49, 1157 (1912).
5. White, C. P., Lancet 11, 701 (1921).
6. Bodansky, Meyer, J. Biol. Chem. 48, 361 (1921).
7. Lindow, C. W., Elvehjem, C. A., and Peterson, W. H., J. Biol. Chem. 82, 465 (1929).
8. Scott. Standard Methods of Chemical Analysis. 4th Ed. p. 197.

Trend From Kitchen to Factory Shown in Eating Habits

MIGRATION to great industrial and business centers during the past few years, coupled with the advance in "communal dining" and the shrinkage of the American kitchen have combined to bring important changes in food production and distribution, according to a study just completed by General Foods Corporation statisticians. The study reveals that the so-called "institution market," made up of restaurants, hotels and other public institutions, accounts for the consumption of 26 per cent of all the food manufactured and sold in the United States. It is estimated that ten years ago this market absorbed but 10 to 15 per cent of the total food production.

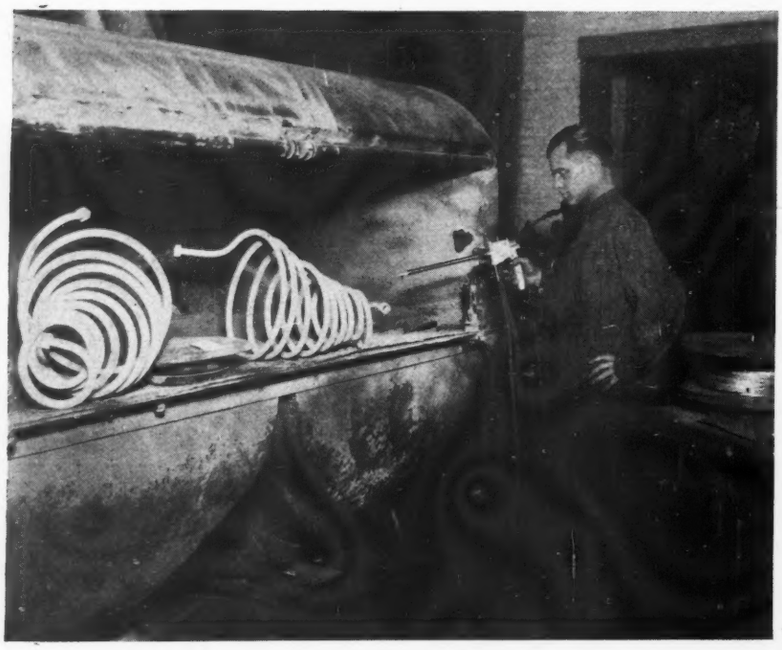
Commenting on the importance of the "institution market" in the present scheme of food distribution, William P. Fay, Manager of Sales for institution products for General Foods, points out that there are more than 7,000 hospitals in the United States which require $190,000,000 worth of food annually; 17,000,000,000 meals are eaten every year in over 100,000 restaurants, while more than 15,000 school cafeterias are serving about 6,000,000 meals a day.

"A few short years ago," said Mr. Fay, "the baker accounted for but 20 per cent of the bread supply of the country. By gradually improving the quality of his product he has enlarged his market to include 80 per cent of all the bread baked in the United States.

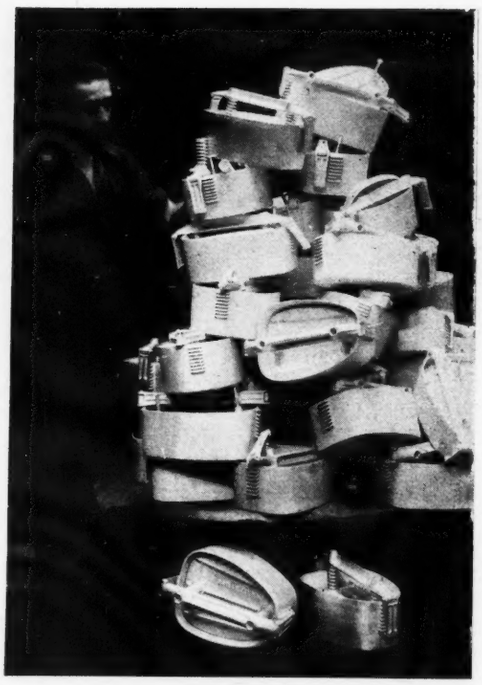
"And we may safely predict a similar metamorphosis in the cake making situation. The baker now produces only 25 per cent of all cake baked and as he learns to bring his product up to the housewife's conception of a cake—to the standard which she has achieved in her own kitchen—the housewife will cheerfully relinquish this burden also.

"To expand his market for cake the baker must improve his product through the use of the highest type of ingredients. It seems safe to predict that the housewife will soon turn over her duties in the cake baking field to the baker.

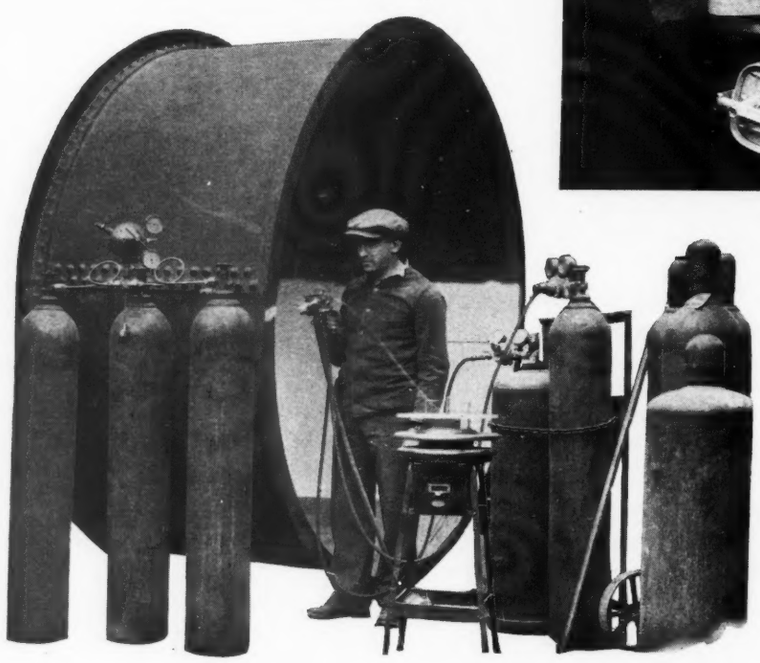
"Educational work plays an important part in the 'institution market.' We maintain experimental kitchens for research work and the development of quantity recipes, and must train demonstrators and lecturers in this field."



Lead-coating the outside surface of steel still coils



Aluminum ham boilers that have been protected against corrosion by the application of sprayed molten cadmium



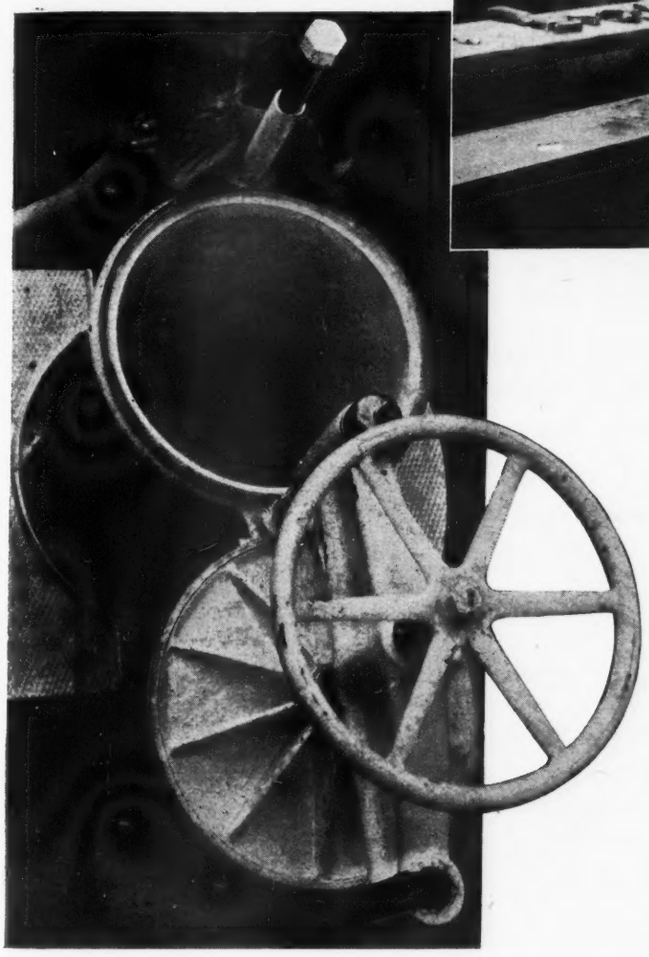
Spraying an aluminum coating on a tank for the storage of vegetable oil

Sprayed Metal Coatings

PROTECT AGAINST CORROSION

By LEOPOLD PESSEL
Chemist and Metallurgist,
Metals Coating Company of America,
Philadelphia, Pa.

A fruit juice extractor with an inside coating of sprayed silver



Coating the inside surface of a tomato cooking kettle with tin

THE struggle against corrosion is probably more relentless in the food industries than in any other branch of our industrial structure. It is here not only a question of maintenance and replacement of equipment, but also a necessity born of public demand and welfare. Purity, freedom from discoloration and similar intangibles are big assets to the food manufacturer in these days of keen competition. The effects of corrosion are often as serious for the sales department as for the production end of the business.

This explains why the food industries have gone much farther in the employment of expensive metals for construction purposes and operating equipment. In some cases, however, the coating of ordinary construction metals, such as steel and cast iron, with a layer of resistant metal, suits the necessities of the case. One of these coating methods is the spraying of molten metal by the Schoop process. The accompanying photographs show some of the applications of this method.

The basic principle of this process is that any metal that is available in the form of commercial wire can be melted, atomized and impacted upon any desired surface by means of a suitable apparatus. In its commercial form the metal spraying machine utilizes an oxygen-acetylene flame for the melting of the metals, while the mechanical part of its operation is taken care of by a supply of compressed air. With this equipment, coherent and adherent, dense coatings may be produced in thicknesses from a few thousandths of an inch up to a half inch or more.

Depending on the use to which the coating is to be put, it may be made of zinc, aluminum, nickel, copper, cadmium, tin, silver, stainless steel or other corrosive resistant alloy, or other metals. In addition to protecting from corrosion, coatings may be applied for withstanding high temperatures. The process is also used for maintenance work, in building up the thickness of worn parts. Blowholes, cracks or joints can be filled by this means.

The cost of applying these coatings varies with the conditions of each application. It is shown by experience, however, that this cost is within commercial limits.

In response to a recent editorial on packing tables, Mr. Demarest prepared this article which contains many ideas worthy of study

PACKING TABLES

By D. DOUGLAS DEMAREST
Vice President, Gunn-Dee Co., Little Neck, L. I.

A PACKING TABLE may be a simple nuisance. It is so simple that often a carpenter and a millwright are its designers, as well as makers, and yet it is a piece of equipment that can be a costly nuisance. A poorly designed table is not only inconvenient and uncomfortable but requires more girls to handle the same output than would a table more carefully designed to fit its particular requirements.

The yard-high table seems to be about the right height for girls who work standing up and it is not too high for girls sitting on comfortable stools. A stool with a bicycle seat would be an interesting innovation. It would keep the girls' knees down and away from the understructure of the table. However, as far as I know, the bicycle seat has been used only in connection with certain foot-controlled machines.

The return belt is at times a difficult problem; often a careful analysis will evolve a design that not only avoids trouble with the belt but works better than the more conventional type. The accompanying sketches illustrate quite a variety of applications and may suggest many more. All of these belts are of proved success and all but the one represented by Fig. 6 are illustrative of installations that are in daily operation. The sketches are conventionalized and are carefully worked out for the purpose of illustrating an idea rather drawing to scale.

Fig. 1 is a conventional packing belt with the return flight brought up close to the under-side of the table. A thin guard is required under it for further protection

Fig. 1—Plain packing belt

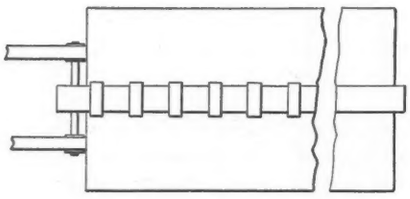
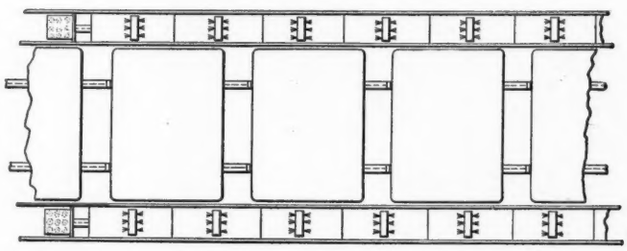


Fig. 2—Intermittent belt in center of table



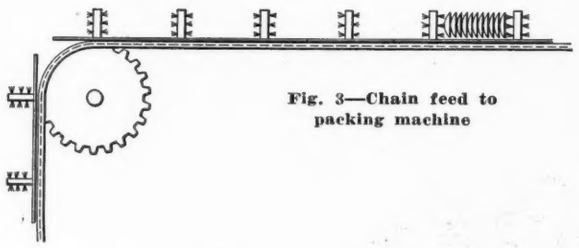


Fig. 3—Chain feed to packing machine

of the workers. One chief objection is that the working face of the belt comes in contact with the face of the lower pulley and with the guard. Sanitary or other reasons may make this an undesirable feature.

A type of belt and table used on a butter printing machine is shown in Fig. 2. It consists of a narrow belt in the middle of a wide table. The girls sitting at either side can easily reach the butter yet their knees are away from the belt beneath the table. This belt is given an intermittent motion which assists the girls in keeping pace with the machine. Each reaches for her next piece at exactly the same spot where she got the last. A steadily moving belt lacks the rhythm that results from the pulsating or intermittent drive. Even heavy assembling chains can often be given this motion advantageously.

A transfer rather than a packing chain is given in Fig. 3. It is a type that is used in connection with a packaging machine. The crackers or other articles are

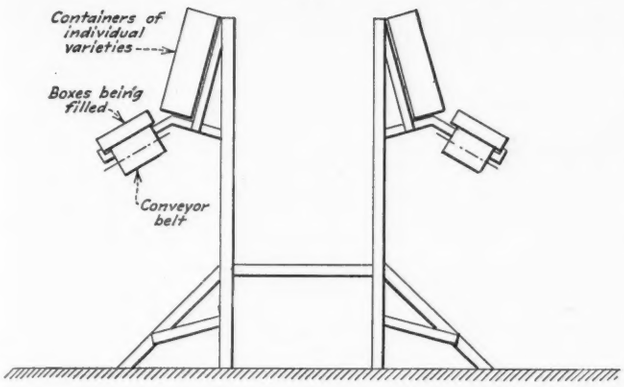


Fig. 4—Twin tables for packing assorted varieties

picked up from trays passing down the table and are placed between the brushes on the chain. This chain carries the material into the machine and returns near the floor. Under special conditions it may be desirable to have this return placed under the floor, or, rather, along the ceiling of the floor below.

An interesting variation is shown in Fig. 4, which depicts an assembling table used in packing assorted goods from containers holding individual varieties. The special features are the inclined surface of the belt, which enables the operator to look into the box she is filling, prevents the goods falling over while the box is being packed, and at the same time puts the return flight far enough away to give the girls knee room. The containers of individual varieties are placed at a still greater angle and above the packing belt. These can be rather easily replaced from the far side of the table, particularly if a step or runway is provided. Two such tables can readily be placed back with a runway between.

The arrangement shown in Fig. 5 avoids belt troubles entirely by not having a belt on the packing table. This machine is quite impressive in operation and could stand considerable explanation. Thin articles, such as wafers or crackers, slide down a short incline into the notches of a rotating transfer wheel that has the appearance of a ratchet wheel. As the wheel turns, fingers projecting from the troughs stop the cakes, and the inclined back or bottom of the notch pushes the cake down the trough and clears enough space for the cake that is in the next notch. Narrow slots are turned in the face of the wheel into which the fingers project, thus preventing damage to the cakes and jamming of the trough.

As these cakes are successively placed in the V-shaped trough they are pushed along the troughs, from which the girls transfer them manually to cartons or other containers. If the troughs are highly polished, practically any substantial material can be pushed far enough for several girls to work on either side of the table. This particular sketch shows the table in use in connection with a pan scraper which takes crackers off the pans, returns the pans to the panning machine, and distributes the crackers across the packing table as shown.

Fig. 6 is rather freakish. It was designed to transfer thin biscuits or crackers standing on edge. The machine consists of a V-trough with round belts moving along the top of the trough. The biscuits ride on their corners on the round belts until they strike a stop. We found that even a few biscuits would travel on edge as long as they move at belt speed. However, when they reached the end of the table or came to a stop and the belts slid under them the last biscuits fell over. If the maximum thickness of the biscuits was at the point of contact with the belt there would be no tendency for the biscuits to fall back. However, the maximum thickness is likely to be a half inch away from the belt, so there is a pull on the bottom of the biscuit and a push a little distance away, which is enough to turn the last few biscuits over.

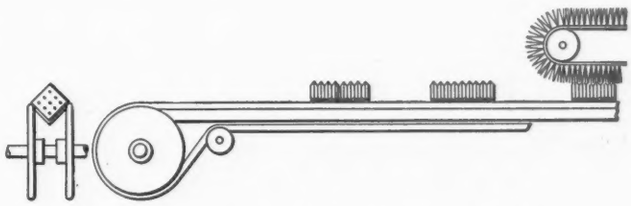
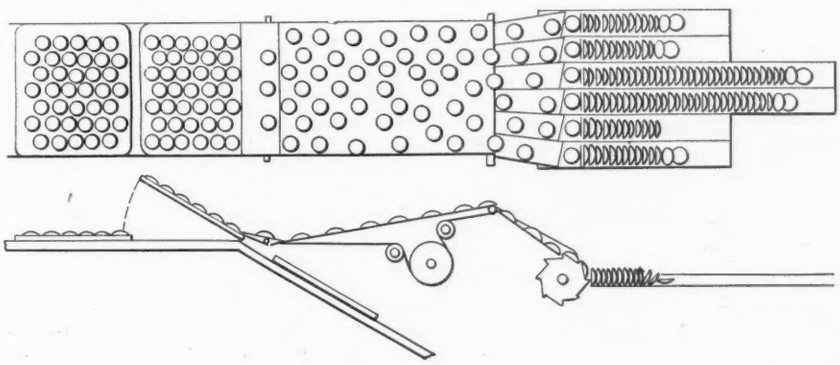


Fig. 6—Belt feed to packing machine

To overcome this a belt with soft bristles sticking out from it was placed above the biscuits. The slight drag of the bristles along the tops of these biscuits kept them vertical as they were fed into a packaging machine. Biscuits or crackers lying flat cause delay to the hand workers and spoilage in the case of a machine.

It is well for engineers to remember that food-industry executives are not primarily mechanics but are interested in things that work. Even these simple devices should be tried out as thoroughly as possible in some quiet corner before being shown to any of the production force.

Fig. 5—Beltless V-groove packing table with pan scraper



Abstracts of Current Literature

CONDENSED MILK AND ICE CREAM. Pericle Parisi. *Giornale di Chimica Industriale ed Applicata,* Vol. 12, pp. 225-35; May, 1930.

The problem of separating lactose from its saturated and supersaturated solutions is significant on account of its relation to sandiness in condensed milk and ice cream. A study of the transition between the alpha and beta forms of lactose indicated that pH value is an important factor; hence a detailed theoretical and practical investigation has been made of the actual influence of pH in lactose solutions. An equation is derived, showing the mutual influence of H and OH ions on the rate of transition of beta-lactose to alpha-lactose. As applied to the optimum conditions for crystallization of lactose for practical purposes, the principal considerations are these: (1) in sugar solutions where mutarotation is involved, the two forms are in reciprocal transition; (2) the two transitions are defined by the velocity constants k′ and k″; (3) these constants depend on the temperature and the pH; and (4) rate of crystallization of lactose from saturated or supersaturated solution depends on the value of k″ and is greater than the rate of transition from beta to alpha. It is believed that this kind of study could be profitably applied to other reducing sugars.

* * *

RANCIDITY OF FATS. J. Davidsohn. *Chemische Umschau,* Vol. 37, pp. 193-6, July 9, 1930.

Although free fatty acids are formed as fats turn rancid, there is not a corresponding accumulation of glycerol; and it is hardly to be expected that glycerol would be liberated in absence of water or alkali. It is not necessarily true, however, that the free acid content of a rancid oil will be high; specimens of very rancid oil have been observed which had acid numbers as low as 1.0; hence, acid number is not a criterion of rancidity. When rancidity has progressed far it is easily enough detected by its characteristic taste and odor; but incipient rancidity is much more difficult to detect. This is unfortunate, because a sensitive and reliable test for the earliest stages of rancidity would be a great help to producers and users of oils and fats. The Kreis test is much used, but careful examination has shown that it is unreliable. A new series of tests has now been made with a modification (proposed by Weidmann) of the Kreis test, in which acetone replaces ether as a solvent, and concentrated sulphuric replaces concentrated hydrochloric acid as the condensing agent. The evidence is, however, that the modified Kreis test is no more reliable than the original.

* * *

BACTERIAL GROWTH IN MEATS. Schmidt. *Zeitschrift für angewandte Chemie,* Vol. 43, pp. 657-8; July 19, 1930.

This paper, presented at the recent Stuttgart meeting of the Deutscher Kälte-Verein, is a study of costs and losses in meat storage as related to bacterial growth. The two principal variables are temperature and humidity; storage life is longer the lower the temperature and humidity, but costs increase as temperature is lowered, and meat weight losses increase with decreasing humidity and moisture content. The accepted standards in Germany are 4 deg. C. and 75 per cent atmospheric humidity. In a quantitative study of the influence of humidity on bacterial growth, the surprising observation was made that growth of the cells does not depend on exceeding the dewpoint. It was also found that bacterial growth is a logarithmic function of the humidity at a given temperature. At 4 deg. C., the storage life is twice as long at a humidity of 75 as at a humidity of 100; at 0 deg. C. and humidity 75, the storage life exceeded the observation time. At 2 deg. C. the humidity could be 88, as compared with 75 at 4 deg.; at 0 deg. C. it could be 92. Below 85, bacterial growth is inhibited to such an extent that, from the standpoint of weight loss in the meat, lower humidities do not seem to be justified. Other variables, not yet studied but probably significant, include size of the pieces of meat, kind of meat, and the fat content.

* * *

PRESSED AND EXTRACTED OILS. E. W. Albrecht. *Chemiker-Zeitung,* Vol. 54, p. 522; July 5, 1930.

Several erroneous opinions are current in the edible oil industry. One is that extraction will completely drive out the oil-pressing process. As a matter of fact, the ability to produce highest grade edible oil by pressing will maintain for the press a permanent place in the industry; it is vain to attempt to bring extracted oil up to the quality of the best pressed oil, because the cost differential between the two processes is made negligible in so doing. Another error is the belief that no extraction apparatus which keeps the material in motion in such a way as to increase the efficiency of the extraction is available. There are several systems which provide this feature; but as long as 99, or even 99.5 per cent, of the oil can be extracted while the material is at rest, there is little incentive for active exploitation of the more elaborate systems. Some also object to extraction on the grounds that solvent losses are high and that the extracted seed cake requires special drying treatment. The best of the modern extractors keep solvent losses down to within about 1 per cent of the amount of seed, and deliver the seed cake in a satisfactorily dry state. Edible oils do not need to be tasteless and odorless; it is preferable that each should have its own characteristic flavor and aroma.

* * *

SIGNIFICANCE OF THERMOPHILIC BACTERIA IN PASTEURIZED MILK. L. A. Rogers and W. C. Frazier. *American Journal of Public Health,* Vol. 20, p. 815; August, 1930.

The natural occurrence of thermophiles makes it easy to account for their presence in milk. Some conditions conducive to a high count of thermophilic bacteria include the following: high initial contamination before pasteurization; inoculation from milk returned from wagons or from defective equipment; infection from foam and residue from previous batch; inadequate cleaning between runs when successive batches are pasteurized in the same vat. A high thermophilic count indicates that one or more of the conditions enumerated exist in the pasteurizing plant.

* * *

THE FORMATION OF VITAMIN D BY MONOCHROMATIC LIGHT. Abraham Lincoln Marshall and Arthur Knudson. *Journal of the American Chemical Society,* Vol. 52, pp. 2304-2314; June, 1930.

Rats that had developed a decided and uniform degree of rickets were fed definite amounts of ergosterol that had been irradiated with monochromatic light of high intensity at various wave lengths. Radiograph comparisons showed the degree of healing produced by the known quantities of treated ergosterol ingested. The results indicated that the amount of vitamin D formed was directly proportional to the light absorbed by the ergosterol in the first stages of irradiation and that the vitamin D content decreased with prolonged irradiation.

* * *

SARDINES IN OIL. H. Wewers. *Zeitschrift für angewandte Chemie,* Vol. 43, p. 656; July 19, 1930.

A case is reported in which food inspectors confiscated a consignment of sardines in oil, contending that the sardines were packed in an adulterated olive oil. The product was from a cannery in Portugal, where high

grade olive oil was available at lower cost than its common adulterants. The canner, knowing that none but pure olive oil had been used, made a thorough investigation, in which his foreign customers (importers) were much interested. The accusation was based on the iodine number of the oil in the suspected cans. Sample cans were therefore made up with a pure olive oil, iodine number 84, and tested at intervals of 4 weeks. There was a steady rise in the iodine number to 116. This is obviously due to the presence in sardines of a considerable amount of fish oil with a high iodine number. The experiments prove that iodine number is not a reliable criterion of the purity of olive oil used in canning sardines.

* * *

DISPENSERS FOR FROZEN FOODS. Reuben E. Ottenheimer. *Refrigerating Engineering.* Vol. 20, p. 102. August, 1930.

As successful sale of frozen foods must be geared to the reactions of the housewife, eye-appeal and the condition in which she finds the product are the deciding factors in selecting the refrigerated show case. Proper lighting of the interior, keeping the display windows free of moisture or frost, efficient insulation without bulkiness, prevention of the accumulation of ice on the coils, and structural sturdiness are some of the requirements that must be met by such a case.

* * *

PROPERLY PROPORTIONING SUGAR TO FLOUR IN CAKES. C. A. Glabau. *Bakers' Weekly,* Vol. 67, p. 61, July 12, 1930; p. 67, July 19, 1930; p. 57, July 26, 1930.

The quantity of sugar which is to be used with a definite weight of flour in cake depends upon a number of factors; such as the kind of cake, the texture desired, and the character of the flour used. Experiments made with pound cake, yellow and white layer cakes, loaf cake, and wine cake show that, in general, a depreciation in the quality of the cake results when the quantity of sugar is decreased or increased as much as 5 to 10 per cent from the optimum.

* * *

A STOCKROOM ON WHEELS. LEWIS K. Urquhart. *Factory and Industrial Management,* Vol. 80, p. 272; August, 1930.

Considerable saving in costs for candy storage at the Charleston District, Boston, Mass., plant of W. F. Schrafft & Sons Corporation was effected by the use of portable steel bins, each holding about 1,000 lb. After being filled with packages, the bins are moved to storage with a lift truck. They are arranged in such a manner that aisle space is saved and removal in proper chronological order is facilitated. A saving of $18,000 during the first year is attributed directly to the replacement of shelving by the bins.

What's on Your Mind?

More About Thermophiles

To the Editor of FOOD INDUSTRIES:

Referring to the letter from C. D. Ingersoll on page 325 of your July issue, the refining industry is to be congratulated on the fact that Dr. Ingersoll's views do not represent the general attitude of the industry. At least four of the large refining companies have been, or are, engaged in investigation designed to show ways and means of eliminating thermophilic spoilage bacteria from their product. This work has resulted in material improvement, and further improvement may well be expected. The serious attitude which has accompanied these investigations leads to the conviction that the problem has been recognized as one of industrial consequence.

On reading Dr. Ingersoll's letter it is clear that it was written either without an adequate understanding of the problems involved or without adequate study of Dr. Cameron's publications to which he refers. Dr. Cameron will offer a statement for your October issue in which he will discuss and point out in some detail the erroneous statements it contains. He has been unable to prepare this statement for the present issue because the drought has necessitated intense activity by the Field Laboratory, of which he is now in charge.

W. D. BIGELOW.
Director of Research Laboratories
National Canners Association.
Washington, D. C.

* * *

A Future for Butchers

To the Editor of FOOD INDUSTRIES:

The concerted opposition on the part of retail meat dealers to packaged consumer cuts, both fresh and frozen, is an obstacle that cannot be lightly dismissed by the manufacturers of such products. Denials of its economic justification and benefit to the public made a few weeks ago by the president of the National Association of Retail Meat Dealers at its convention in Minneapolis, Minn., will undoubtedly be passed on to inquiring customers by butchers in the belief that they are protecting their own interests. As one of the individuals influential in securing passage of the Minneapolis city ordinance which limits the sale of meats to retail stores possessing walk-in coolers said, "We simply looked ahead. We desired to protect the business of the butcher." I am wondering if they looked ahead far enough.

If the development of packaged meat offers real economies in distribution, these emotional generalizations and reactionary ordinances will not stop its growth.

As a matter of fact, the retail meat dealer of today performs two distinct functions. He is both a cutter of meat and a merchandiser of meat. The first requires skill and experience in getting the greatest number of pounds of marketable meat out of a certain carcass. The second requires skill and experience in getting the greatest number of pounds of meat into the kitchens of his customers. These tasks have been performed under the same roof simply because they could not be separated without injuring the product. Otherwise they are not inherently related. The chief value of wrapping and freezing, or wrapping and close temperature control, is that it permits separation of production and merchandising operations, with all the resultant economies of such division of labor.

The advantages of cutting meat on a production basis are certainly obvious. Mechanical handling can be used to great advantage; the physical energy used in cutting flesh and bone can be supplanted by more efficient mechanical means; the strict technical control required by a perishable product is made more readily possible; byproducts can be produced in sufficient quantity to justify themselves. Furthermore, centralized cutting eliminates transportation costs on portions of negligible value, permits accurate records of weights and losses, and allows separate consideration of cutting-costs and merchandising-expenses.

In the operation of such a centralized cutting plant, those whose vocation is primarily meat-cutting will certainly find a place.

Selling is an equally important task, but it generally requires a different temperament and a different training if it is to be done efficiently. The producer deals primarily with things, the seller with people, and the attention of each must center in his field. True, the seller must have a knowledge of meats, but he must see them as they affect the menu of his customers; as something to be eaten, rather than something to be produced from a carcass. Free of the tasks of slicing and sawing, he can concentrate on selling, can become a real counselor for the housewife.

Some day soon, it may be, the retail meat dealer will have to decide whether cutting meat or selling meat is to be his future vocation. He will surely find a place to do one or the other. Only the person who is neither a meat cutter nor meat seller, but merely a supplier of physical energy in conveying, wrapping, and pushing a saw, will find himself, like so many others before him, ousted by the impregnable combination of human brains and mechanical power.

ELROY R. MARVIN.
New York City.

Critical Book Reviews

BETWEEN TWO OCEANS (Rapid Chilling and Freezing Systems for Meat and Fish). By M. T. Zarotschenzeff. Published by *Cold Storage and Produce Review, London,* England. 1930. Paper, 157 pp. Price, 5 shillings.

THE large percentage of quantitative information—actual facts and figures—assembled in this volume would make it valuable to those interested in frozen foods even if the interpretation of such data had been made by one of less authority in the field. As it is, Mr. Zarotschenzeff's work, written following his trip to plants throughout United States and Canada last fall, is an outstanding and modern treatise on the theory and practice of freezing fish and, to a lesser degree, of freezing meats.

Discussion of the highly controversial relations between changes in cell structure and such factors as time and temperature of freezing; initial quality, treatment, and size of products, storage temperature, and protection of the frozen product from air, are predicated upon the results of actual experimentation, chiefly that done by the Biological Board of Canada. Special emphasis is laid upon the importance of freezing the fish while it is absolutely fresh, and Mr. Zarotschenzeff goes so far as to predict that fish will have to be rapidly frozen on board the fishing vessel immediately when caught if the industry is to achieve continued prosperity. To obtain packaged fillets of the finest quality, it may be necessary to freeze the whole fish aboard ship, bring them to shore, thaw, fillet, and then refreeze them, he points out.

A description of the recognized methods of "sharp freezer," direct brine, and indirect brine freezing is given. Due to modesty, according to a statement in the introduction, he did not see fit to make the list complete by including a description of his own work. The author's comparison of these systems gives concrete evidence of the superiority of freezing by the indirect brine, or "quick," method; both for meat and fish. The freezing of meats with air in a sharp freezer, even when they are wrapped and air temperature is down to —50 deg. F., is condemned as inefficient by Mr. Zarotschenzeff.

Two short chapters are given to a consideration of the future of the industry. The position of the Institute of American Meat Packers as an important force for the development of the freezing of meats in the United States is stressed. The tremendous possibilities of shipment of high-quality quick-frozen consumer cuts of meat to England from Australia and New Zealand was the author's concluding thought.

The book contains over 100 illustrations, but many of them lose value because of poor reproduction. Perhaps this, as well as certain typographical inaccuracies and the lack of a comprehensive index, can be ascribed to the haste necessary to publish an up-to-date book in such a fast-moving field.

E. SCOTT PATTISON.

* * *

MATERIAL HANDLING EQUIPMENT. By Edward J. Tournier. McGraw-Hill Book Company, Inc., New York, 1929. 371 pp. Price, $4.

ALTHOUGH the beginnings of mechanical handling of materials date back some thousands of years, it is only in very recent times that this manufacturing process has shown any advance sufficiently marked to gain separate attention. Consequently, technical literature is meager in its treatment of this subject and there are but few textbooks and reference works to which one can turn for information on it. Mr. Tournier's work, therefore, is a welcome addition to recorded knowledge in this field.

The title of the work is an accurate description of its contents, for it deals with the equipment available for carrying out the unit process, rather than with the engineering principles upon which the process is based. However, by citing many cases from actual practice, the author indicates in a helpful way what some of these principles are and how they should be employed.

Unfortunately, no great part of the book is devoted to the handling of materials from one operation to another in the manufacturing plant, which has become by far the most important phase of the subject in many process industries. Approximately half of the space is taken up with a helpful, illuminating discussion of the handling of bulk and raw materials. This part of the work will be most useful to those whose problems include unloading, storage, and rehandling.

Chapters on the selection and purchase of materials handling equipment also are of much value, for they will enable those not thoroughly familiar with the process to avoid many pitfalls; another concise and useful chapter is concerned with handling finished products.

Considered as a whole, this book represents a first-class empirical treatment; although it does not proceed from the rational or engineering standpoint, which the unit processes usually require, it is the best book available today on its subject.

GRAHAM L. MONTGOMERY.

* * *

FRUIT MARKETS IN EASTERN ASIA. By B. H. Crocheron and W. J. Norton. Bulletin 493, Agricultural Experiment Station, University of California, Berkeley, Calif. Contribution From the Giannini Foundation of Agricultural Economics. 366 pp.

THE results of an 8-months study of the possibilities for increased markets for fresh, dried, and canned fruits in the countries of the Far East is reported in this work. In their travels the authors covered Japan, China, Korea, the Phillipines, British Malaya, French Indo-China, Siam, India, and the Netherlands East Indies. These countries comprise half the population of the globe (but only 671,146 Europeans and Americans) and at first thought should be a fertile field for exploitation by the exporter of food products.

As far as fruits are concerned, the authors found it quite otherwise. Their conclusions are neither comforting nor encouraging to the exporter of fresh, dried, or canned fruit. The average income of the people is distressingly low; much too low to purchase sufficient imported fruit and fruit products to materially affect our domestic prices. Most of the countries visited have ample domestic sources of fresh fruit, and shipping them American-raised fresh fruits is carrying coals to Newcastle with a vengeance. China has a canned- and dried-fruit industry of considerable extent, and, while the quality of the output is inferior to that of the United States, the Chinese are satisfied, for it is cheap and they are not familiar with the better grades.

As a general rule, most of these people do not know how to cook dried fruits, but eat them raw as a confection. Raisins, prunes, and figs are popular, and the familiar 5-cent package of raisins, as well as ones retailing for less, are favorably known throughout the Far East. Canned fruits usually are considered luxuries, to be indulged in only on rare and ceremonious occasions. Hitherto most canned fruits have been sent abroad in No. 2½ or No. 1 tall cans, making their price almost prohibitive as far as the bulk of the people are concerned. The smaller 8-oz. can probably could be sold to better advantage.

The authors of "Fruit Markets in Eastern Asia" have gathered together an immense amount of valuable and sometimes curious information about the food habits, buying and selling methods, and economic status of the Asiatic peoples. They have presented it in a fashion much more interesting than is usual in most reports of this kind. The volume is liberally illustrated with original photographs and contains 112

tables, many of them showing retail prices in the countries visited. It is not indexed, but is so subdivided that information relative to the different countries is readily found.

EARL D. STEWART.

* * *

BACTERIOLOGY, by Stanley Thomas, Professor of Bacteriology, Lehigh University. Second Edition, McGraw-Hill Book Company, Inc., New York, N. Y. 1930. Price, $3.

IN 292 pages of text Professor Thomas gives us a picture of the science of bacteriology in its various applications without neglecting the historical setting or the questions of biology, physiology, and classification, and a consideration of other forms associated with these organisms.

A few unimportant typographical errors do not in any way detract from the value of the book nor mar its excellent make-up. Some instances of repetition occur which might be eliminated, although these are not serious objections. Perhaps too much has been crowded into the chapter on "Bacterial Enzymes," which seems quite as much a chapter on metabolism as on enzymes, and the result is a little confusing. It takes from the reader the clear-cut impression which could be conveyed with a slight readjustment of chapter title and contents. In places an extra sentence or two might well be used to explain more fully some statements, as, for example, in the section concerning Koch's laws (page 242) which, while fundamentally correct, must be somewhat modified in the light of present knowledge.

Aside from these minor criticisms the book, considered as a whole, is excellent and for the individual whose work is in a field that calls for some knowledge of bacteriology it should certainly fill the need in an adequate and thoroughly satisfactory manner. "Bacteriology" is written in a style easily read, not too technical nor too detailed, and with the virtue of being well balanced in its presentation of the various phases of the science. Professor Thomas deserves great credit for having accomplished the very difficult task of writing in a comparatively few pages a correct and comprehensive work on the entire and extensive subject of bacteriology.

JOEL A. SPERRY.

* * *

THE COCOA AND CHOCOLATE INDUSTRY. By A. W. Knapp. Second Edition. Isaac Pitman & Sons, New York City, 1930. Cloth, 8⅝x5¾; 188 pp., 42 illustrations. Price, $2.25.

IN THIS revised and enlarged edition of his handbook on the cocoa and chocolate industry, the author has given the reading public an interesting book. Although written for the non-technical reader and containing several chapters on the more classical phases of the industry, the book is of considerable interest to the executive and the technologist in the food industry. The chapters on cost of production, statistics of the industry, and storage of the products are especially timely.

Not often does one find such a complete cross-section of an industry in one volume of so few pages written in such enjoyable style. It is well indexed and contains a bibliography of selected books and periodicals that deal with cocoa and chocolate.

* * *

STRUCTURAL ALUMINUM HANDBOOK. Published by Aluminum Co. of America, Pittsburgh, Pa., 1930. Flexible binding, 8½x5½ in., illustrated, 33 tables, 120 pp. Price, $1.

STANDARDIZED structural shapes of strong aluminum alloys have been available for a short time only, but already they are taking a place beside the familiar steel shapes. Particularly for industrial purposes, where light but strong structures are required, or the physical properties of aluminum are more desirable than those of other metals, these new construction materials are meeting a need.

It is, therefore, a distinct service to engineers and designers that is performed by this handbook. In scope and general treatment, it is quite similar to the steel handbooks that have been mainstays for so many years. All special information needed in the selection of aluminum is given, and the presentation and relatively large type make the tables easy and pleasant to use.

* * *

THE RELATIVE DIGESTIBILITY OF UNSWEETENED EVAPORATED MILK, BOILED MILK AND RAW MILK BY TRYPSIN IN VITRO. By Zonja Wallen-Lawrence, B.S., and F. C. Koch, Ph.D. Laboratories of Physiological Chemistry, University of Chicago. Reprinted from *The American Journal of Diseases of Children,* January, 1930; Vol. 39, pp. 18-33. —A dissertation on research work done during the tenure of a fellowship from the Evaporated Milk Association.

Government Publications

DOCUMENTS ARE AVAILABLE *at prices indicated from Superintendent of Documents, Government Printing Office, Washington, D. C. Send cash or money order; stamps and personal checks not accepted. When no price is indicated pamphlet is free and should be ordered from bureau responsible for its issue.*

National Standards for Farm Products, by Lloyd S. Tenny. U. S. Department of Agriculture, Circular No. 8; 15 cents. A general discussion of principles.

Australian Raisin and Currant Industry and Trade, by E. C. Squire. Bureau of Foreign and Domestic Commerce, Trade Information, Bulletin No. 699; 10 cents.

Markets for Fruit Juices and Fruit Syrups in Latin America, by C. F. Stephenson. Bureau of Foreign and Domestic Commerce, Trade Information Bulletin No. 702; 10 cents.

Oyster Investigations in Georgia, by Paul S. Galtsoff and R. H. Luce. Bureau of Fisheries Document No. 1077; 15 cents.

Yearbook of Agriculture, 1930. Issued by the U. S. Department of Agriculture; $1.50. A summary of progress in agricultural science and practice in 1929.

Container Testing, by H. A. Spilman and T. C. J. Baker. U. S. Department of Agriculture, Miscellaneous Publication No. 75; 5 cents. Describes method of testing capacity of fruit and vegetable containers under the U. S. Standard Container Acts.

Co-operative Marketing of Fluid Milk, by Hutzel Metzger. U. S. Department of Agriculture Technical Bulletin No. 179; 20 cents.

Authorized Food Colors, by O. L. Evenson and H. T. Herrick. U. S. Department of Agriculture Department, Bulletin No. 1390, Supplement No. 1; 5 cents. Chemistry and analysis of the permitted coal-tar food dyes Ponceau SX, Sunset Yellow FCF, and Brilliant Blue FCF.

Veal Grades, by W. C. Davis and C. M. Harris. U. S. Department of Agriculture, Circular No. 103; 25 cents. Discusses market classes and grades of dressed veal and calf carcasses.

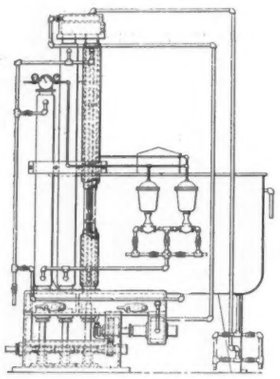
Fake Antiseptics and the Law. Mimeographed leaflet from the Food, Drug, and Insecticide Administration, U. S. Department of Agriculture, dated January, 1930.

Sucrose Content of Sugar Beets, by Dean A. Pack. Reprint from the *Journal of Agricultural Research,* U. S. Department of Agriculture, Vol. 40, No. 6; March 15, 1930. Discusses selection characters as correlated with percentage of sucrose, weight, and sucrose content of sugar beets.

The Production of Peas for Canning, by Chester J. Hunn, U. S. Department of Agriculture, Farmers' Bulletin No. 1255.

Selected Patents

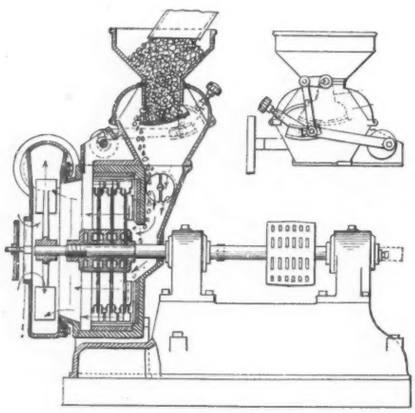
Quick Tempering of Large Quantities of Chocolate—Alonzo Linton Bausman to National Equipment Company, Springfield, Mass. No. 1,763,086. June 10, 1930—Quantities of chocolate to the extent of a ton or more are cooled from about 110 deg. F. to approximately 88



deg. F. in about 30 minutes. The chocolate, which is temporarily stored in a container fitted with an agitator and a jacket through which flows a tempering medium, is pumped through three vertical pipes connected in series. These pipes are jacketed and equipped with a scraping stirrer to prevent the cooled chocolate from freezing to the surface of the pipe and clogging the flow of chocolate through the system. Thermostatically controlled valves regulate the flow of the tempering medium through the jackets of these pipes to correspond to the temperature of the chocolate that is being pumped from the mixer through the tempering pipes.

* * *

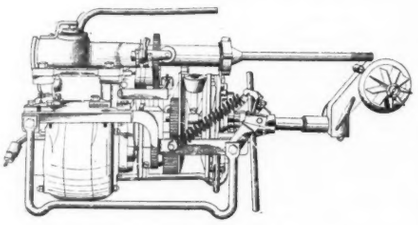
Fuel Pulverizer—Benjamin A. O'Neill to Schutz-O'Neill Company, Minneapolis, Minn. No. 1,765,309. June 17, 1930—Material to be pulverized is fed at a controlled rate to the grinding chamber



fitted with three revolving lug plates and a hard metal corrugated lining. As the material passes between the revolving lug surfaces and the corrugated lining it is successively crushed to the desired fineness to permit its passage from the grinding chamber to the mixing and delivering chamber. An adjustable cone plate regulates the size of the particles that are allowed to pass from the grinding chamber into the delivering compartment. Special construction prevents the admission of metallic or other unbreakable substances into the grinding area and permits their removal without interference with the operation of the machine. The delivery compartment is equipped to mix air with the powdered fuel in the proper proportions to give the desired combustion mixture and to force the mixture into the combustion chamber.

* * *

Sausages Linked Automatically — Walter J. O. Johnson, Chicago, Ill., to Allbright-Nell Company, Chicago, Ill. No. 1,759,851. May 27, 1930—Despite variations in diameter of casings, this invention proposes to produce sausage links of uniform length automatically. This length is predetermined and, by means of pneumatic or mechanical control, the stuffing nozzle rotates when the



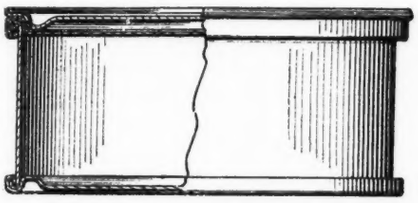
stuffed portion of the casing has reached the desired length. The rotating of the stuffing nozzle results in the formation of a link by twisting the casing at the muzzle of the stuffing tube. The mechanical construction of the machine as a whole differs considerably, depending on whether the stuffing nozzle is pneumatically or mechanically controlled. The illustration shows the mechanically controlled type. As the casing fills it passes over the reel-like mechanism adjacent to the stuffing nozzle; this control mechanism is caused to rotate. When it has rotated to the predetermined point, it trips the cam that causes the stuffing nozzle to rotate smoothly and automatically. In this manner the casing is twisted and a link of sausage having the desired length is made.

* * *

Roasting Cocoa Beans at Low Temperatures—Henry L. Borg, Stamford, Conn., to Postum Company, Inc., Battle Creek, Mich. No. 1,768,230. June 24, 1930—In this process cleaned market-run cocoa beans are treated with an excess of hot water to give the beans a uniform moisture content. By subjecting these beans in a rotating cylinder at a temperature of 165 to 170 deg. F. under reduced pressure the moisture content is uniformly lowered to 1 or 2 per cent in an atmosphere with low oxygen content. It is claimed that this residual moisture is confined mostly to the shell of the bean and that no oxidation action has taken place. The last traces of moisture are removed and the aroma and flavor developed by further treatment at 220 to 230 deg. F. at atmospheric pressure with constant agitation. This method of roasting is said to result in a cocoa liquor unusually low in moisture, more delicate and pleasing in flavor and aroma, with greater spread for covering, and with more resistance to softening under summer heat conditions.

* * *

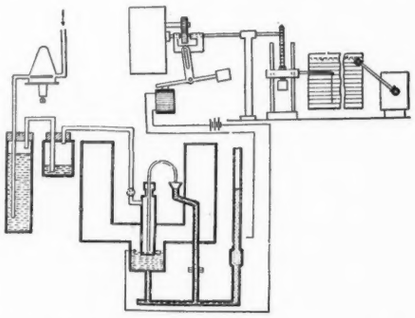
Combined Shipping and Display Container — William F. Punte, Passaic, N. J., to Continental Can Company, Inc., New York, N. Y. No. 1,765,383.



June 24, 1930—This invention provides for fitting a can or similar shipping container with a transparent, fragile closure for display purposes and with a metal protective closure for shipping purposes. The display closure is fitted inside of the can and secured by the double seam which joins the top end to the body of the can. Extending about the opening and about the bottom of the can is a seat for the metal cover. The metal cover is constructed to frictionally engage the opening seat and close the container for shipment. If the can is to be used for display purposes, the metal cover can be removed from the opening, which remains sealed with the transparent closure, and fitted into the bottom of the can. By this means, loss of the cover is prevented.

* * *

Automatic Determination and Recording of Specific Gravities of Fluids — Harry A. Hurley, Los Angeles, Calif.; Herbert J. Jones, Fullerton, Calif.; and Honorato Jimenez, Los Angeles, Calif. No. 1,764,103. June 17, 1930—By means

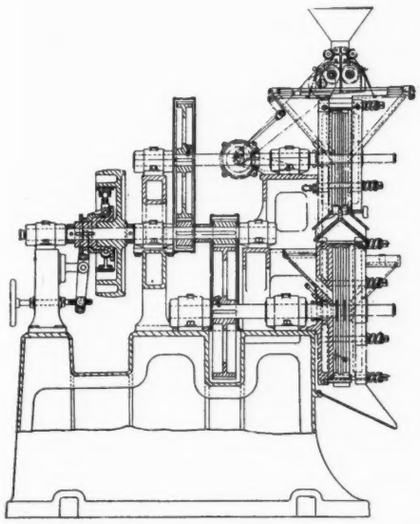


of the apparatus shown in the illustration it is possible to measure the time required for the fluid pressure to build between the point of electrical contact in the mercury column and another level in the same tube. By comparing this time of filling with that of a standard—for example, air—the specific gravity of

the gas under observation can be given as a decimal value of the specific gravity of air, which is unity. When the mercury column closes the electrical contact, a magnet causes two revolving pinions to engage, thus actuating a stylus that records the filling stroke of the mercury pump.

* * *

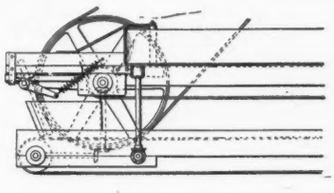
Continuous Process for Milling and Refining Cocoa Liquor—William Edward Prescott, Harrow, England, to Baker Perkins Company, Saginaw, Mich. No. 1,758,804. May 13, 1930—Direct production of refined cocoa liquor from the nib form eliminates storage and extra handling of an intermediate product. In this invention the nibs are fed at a controlled rate into a chamber containing two grinding surfaces that revolve in reference to two stationary



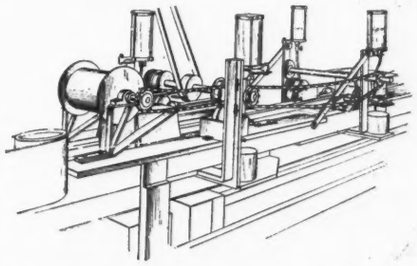
grinding surfaces which crush and tear these nibs into a mass of coarse cocoa liquor. By gravity feed this mass flows into a second chamber containing two sets of disk grinding surfaces that produce cocoa liquor refined to the desired smoothness. These grinding surfaces are similar in design to those in first chamber. The supporting plates of the non-rotating disks in both chambers are capable of being water-cooled, or heated, to give the desired temperature. Coiled springs between these plates and the heads of their support bolts regulate the pressure between the grinding surfaces and in that manner control the degree of smoothness in the resulting liquor. The illustration indicates the construction of the machine and the manner in which the driving power is applied.

* * *

Carton Sealer With Return Mechanism for Finished Package—James R. Wysong to Larus & Brother Company, Richmond, Va. No. 1,763,493. June 10, 1930—This machine is designed to seal each end of the filled carton, drop it to



a lower level, and return it to the operator. The cartons enter the machine horizontally in such manner that, in successive steps, the lower halves of the end laps are opened, inside surfaces



covered with adhesive, laps returned to closed position and held firmly in place. These operations are progressively repeated for the upper halves of the laps. The sealed carton is conveyed in a continuous manner between a pair of adjustable vertical side conveyors that operate in conjunction with the horizontal conveyor and continue the pressure on the ends. At the end of the conveyor is a pivoted-dumping board which controls the fall of the sealed carton onto an under conveyor. This conveyor travels in the opposite direction and delivers its load at a point convenient to the feed end of the sealing machine.

* * *

Clarification of De-alcoholized Cereal Beverages—Herman Heuser, Evanston, Ill. No. 1,764,955. June 17, 1930 — Albuminoids, which cause cloudiness or a sediment in de-alcoholized cereal beverages after pasteurization or upon standing, are removed before pasteurization. Tannins such as gallo-tannin, catechu, phlo-tannin and the like; proteolytic enzymes such as pepsin, peptase, papain, brolemin, and the like; and such reducing agents as soluble sulphites, formates, phosphites, hypophosphites and the like, are added separately or in combination, to prevent the formation of cloudiness or sediment after bottling. The tannins accomplish the removal of the heavy metals, such as calcium, tin, and zinc, that would likely combine with any albuminoids and cause haziness. The proteolytic enzymes digest the albuminoids and thus prevent their appearance in their insoluble state after pasteurization. The reducing agents remove the dissolved oxygen that may be present in the beverage and might result in darkening.

Copies of Patents

Complete specifications of any United States patent may be obtained by remitting 10c. to the Commissioner of Patents, Washington, D. C.

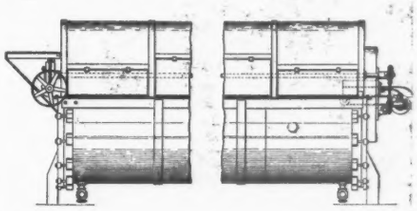
Photostatic copies of foreign patents may be obtained at the same address, prices being forwarded on application.

* * *

Cured Meats Gelatine Coated—Carl G. Hasselblad, Grosse Point, Mich., and Aimee J. Catellier, Detroit, Mich. No. 1,765,485. June 24, 1930—An edible gelatine is made from such materials as pork rinds by boiling up 2 parts rind in 1 part water, removing all grease and fat, cooking to desired density, and sometimes adding 2 parts sugar. The sugar is added in case the goods to be coated are exceptionally greasy. The meat to be coated may or may not be smoked or cured previous to coating. Gelatine solutions of different densities are used, according to type of meat coated. Meats are dipped momentarily into heated gelatine, cooled quickly in air or water at 32 to 40 deg. F., dried slowly for 1 to 2 hours at 70 deg. F., and finally dried at 140 deg. F. until the coating is fully dry and hard. This invention is claimed to produce more satisfactorily flavored and preserved meats, and, in case of coating before smoking, it is claimed to give low shrinkage.

* * *

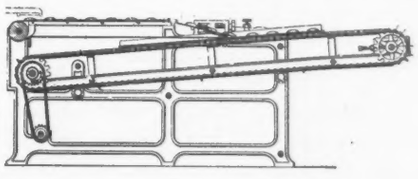
Charging and Discharging Mechanisms for Vegetable Blanchers—John Schmidt to Sprague-Sells Corporation, Hoopeston, Ill. No. 1,758,064. May 13, 1930—The charging hopper is designed to place the vegetables so far in on the revolving



screen that no part of them will fall between the outer shell and the revolving screen of the blancher. The discharging mechanism consists of a short conveyor so shaped that such vegetables as string beans do not clog or bridge it, thus preventing continuous discharge of the blancher. One end of this conveyor extends sufficient distance inside the screen to catch the vegetables as they follow the screen in rotating. The other end protrudes outside the blancher far enough to allow the blanched vegetables to be readily removed from the moving belt.

* * *

Mechanical Transfer of Iced Cakes to Drying Trays—Estate of William Costello, Jr., Philadelphia, Pa., to National Biscuit Company, New York, N. Y. No. 1,762,764. June 10, 1930—This machine consists of two conveyors correlated in position and in movement to receive cakes from an icing machine and place them in position on drying trays. The

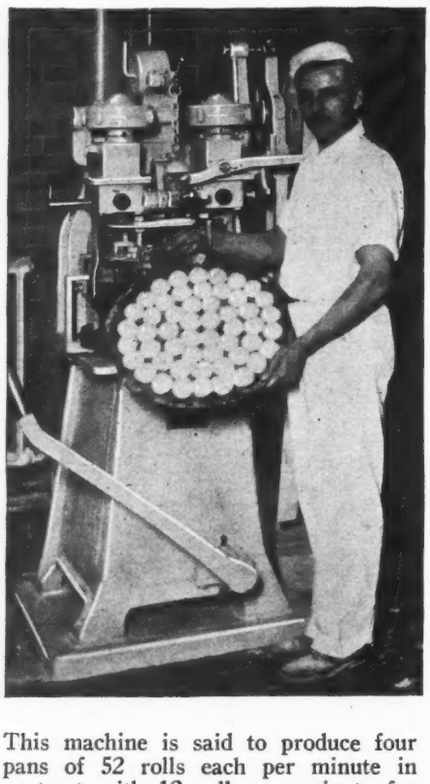


accompanying illustration indicates a form that this machine may take. The upper conveyor can be regulated in height at its outer end to allow clearance for the trays with a minimum drop of the cakes into the trays. By cam and arm control the movement of the lower conveyor is regulated to prevent deposition of the cakes over the space between adjoining trays and to give uniform spacing between rows of cakes.

Manufacturers' News And Equipment

Large-Volume Combination Roll Divider and Rounder

HAND WORK in the baking industry is further eliminated by the Wizard combination roll divider and rounder manufactured by Herm. Bertram, Halle, Germany, and recently introduced into the United States by Petri & Jones, 186 State St., Boston, Mass.

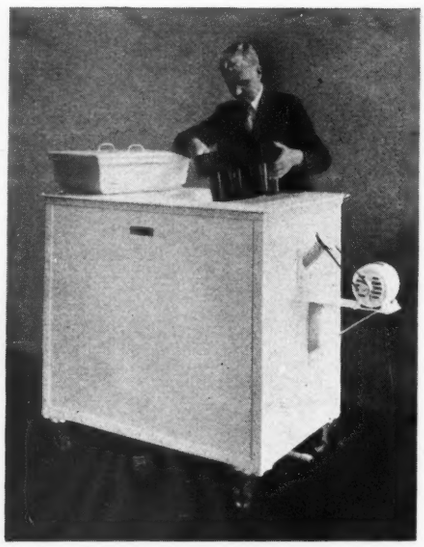


This machine is said to produce four pans of 52 rolls each per minute in contrast with 12 rolls per minute for each experienced man on hand rolling. It is adapted for use with all types of rolls and with jelly doughnuts.

Quick-Freezer Unit for Experimental Purposes

TO OBTAIN exact first-hand information about various brine temperatures and rates of freezing with different food products, temperatures as low as —50 deg. F. and capable of being regulated to suit requirements are available now on a laboratory scale.

In the quick-freezer unit developed and marketed by the Quick-Freeze Corporation, Graybar Building, New York, N. Y., 300 to 600 lb. of brine is cooled



by contact with charging pans containing solid CO_2. A small motor-driven propeller circulates the brine at regulated speeds comparable to those found in production units. High insulation of the brine tank and its freezing compartment, special design of the charging pans, and control over supply of solid CO_2 in the charging pans make accurate experimental tests possible.

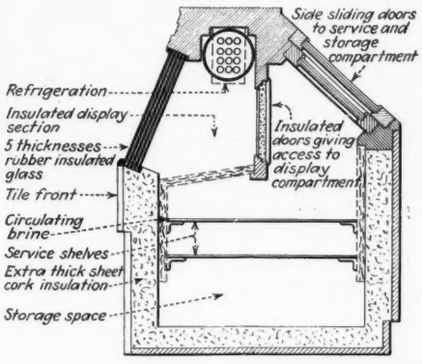
Molds and containers to be used in this unit for carrying on freezing tests with a wide variety of food products are available to purchasers.

Specially Designed Case For Frozen Foods

A REFRIGERATED case in which the display compartment is separate and insulated from the service and storage section was placed on the market recently by the Weber Showcase & Fixture Company, Inc., 5700 Avalon Blvd., Los Angeles, Calif.

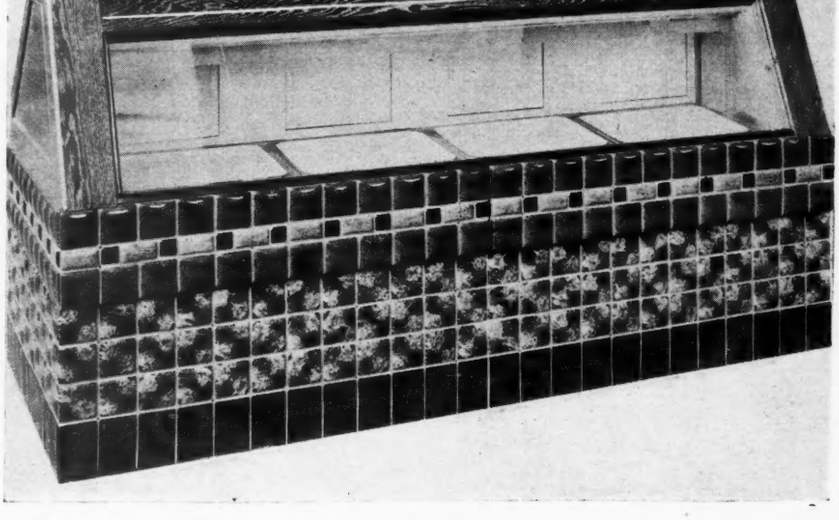
Temperature changes are reduced to the minimum because flat construction of the refrigerating surfaces permits removal of accumulated frost by scraping instead of by defrosting and because separation of the compartments prevents air circulation throughout the entire case.

The interior of the case and the bottom of the display compartment are incased in a jacket of cold brine, which is circulated to give the desired refrigeration. A ½-hp. compressor will maintain the necessary low temperature, and the sub-zero jacket of circulating brine retains the low temperature in case of a temporary power shut-down.



The case contains 8 sq.ft. of display space, 16 sq.ft. of bottom space for storage, and 25 sq.ft. of shelf space for storage and service purposes. It is adapted to any type of mechanical refrigeration and is free from fogging

Case Designed for Frozen Foods



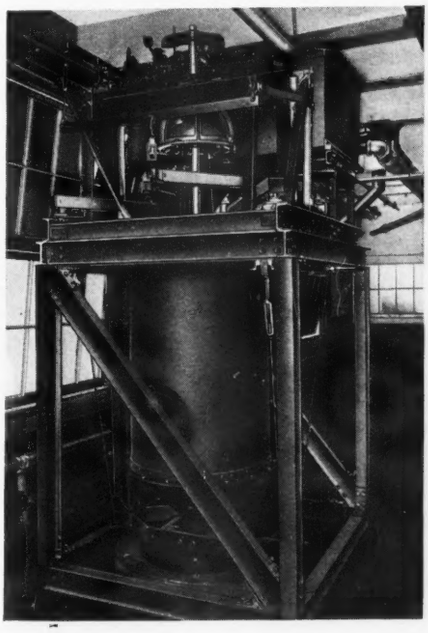
or frosting of glass. The front of the display consists of five thicknesses of rubber insulated plate glass.

New Self-Indicating Scale

AN EQUIPOISE scale designed to weigh correctly with the scale at any level and with the load on any part of the scale pan has been recently placed on the market by the Toledo Scale Company, Toledo, Ohio. This Gravitygram scale is said to be sensitive to ½ oz. and to have an indication that is read correctly from any position. These features make it valuable for package weighing purposes. It has a maximum capacity of 30 lb. Exposed metal parts are chromium and stainless steel.

Bulk Liquids Weighed Automatically

BY EMPLOYING float and weighing-beam control of inlet and discharge valves, the Richardson Scale Company, Clifton, N. J., has developed a revolving-tank liquid scale that has a unit capacity of from 375 to 3,250 lb. This scale finds application in weighing of vegetable oils and the like when received or during plant operations. The larger unit has a rate capacity of 200 tons per hour.



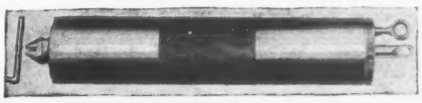
This equipment consists of a receiving tank at the top connected with the incoming pipe line and fitted with a valve controlled by the action of the weighing beam, and a weighing tank mounted on an axle and divided into two compartments. The weighing tank is slightly inclined from the vertical. When the liquid in the upper compartment has been weighed, the tank is released, and the weight of the liquid causes the tank to revolve half way. As the tank revolves, a cam lifts the discharge valve and empties the weighed material. Simultaneously the inlet valve is opened and the other compartment begins to fill. The discharge valve has a diameter twice that of the inlet valve, thus assuring that the weighed material is discharged before the incoming material fills the other side of the weigh tank. Each weighing is recorded on a six-figured continuous counter and on a three-figured set-back ticket-printing counter.

Float control causes the weighing beam mechanism to lock if the level of the liquid in the inlet tank falls below a certain point; the scale will not operate if the receiving tank contains an insufficient supply of material for another complete weighing. The weighing tank is equipped with an outlet of a type that prevents splashing and allows direct discharge into a pipe line and with a specially designed cover to prevent loss when hot, steamy, or frothy liquids are to be weighed.

Liquid Sampler

THE development of a liquid sampler has been announced by Hills-McCanna Company, 2349 Nelson St., Chicago, Ill. By means of this instrument a composite sample of any fluid may be obtained from three depths of tanks or tank cars in a single operation; even from the extreme bottom of the container.

This sampler consists of a hollow non-sparking metal cylinder 13 in. in length, a close-fitting piston operating without packing on the inner wall of the cylinder, and interchangeable nozzles for handling liquids of varied viscosity fitted for the outlet in the lower end of the cylinder. The sampler operates on the single-plunger suction principle and is so constructed that one-third of the cylinder can be accurately filled from each of the three desired levels of the material to be sampled.



◂◂ Manufacturers' Publications

Coffee Roasters—In their 24-page illustrated bulletin No. 331 Jabez Burns & Sons, Inc., 11th Ave. and 43d St., New York, describe the various types of coffee roasters manufactured and installed by them.

Lactic Acid—C. M. Armstrong & Company, 1 Hudson St., New York, in a leaflet call attention to its lactic-acid products.

"Hand-Rolled" Centers—In illustrated leaflets, Harry L. Friend, 52 India St., Boston, Mass., describes his machine for making plastic-center confections that can be fed directly to a dipping machine.

Flour-Handling Machinery—In an attractively bound booklet, well illustrated, Baker Perkins Company, Saginaw, Mich., describes its line of equipment for the handling of flour.

Laboratory Ovens—In an illustrated leaflet, Freas Thermo-Electric Company, 1206 South Grove St., Irvington, N. J., announces its series of control electric laboratory ovens with a horizontal flow of air circulation.

Dough Mixers—Dough mixers for various sized baking shops are described and illustrated by Baker Perkins Company, Saginaw, Mich., in an attractively bound 16-page booklet, recently published.

Overload Switch—By photograph and leaflet, Cutler-Hammer Company, Inc., 106 12th St., Milwaukee, Wis., announces and describes its new starting switch for small alternating or direct current motors.

Scale—Toledo Scale Company, Toledo, Ohio, announces its new Toledo Gravitygram type of scale, in an illustrated leaflet.

Flexible Spiral Conveyor—In an eight-page illustrated booklet, Clark Tructractor Company, Battle Creek, Mich., shows specific application of the Twinveyor. It is a flexible, portable, power conveyor for quick movement of commodities.

Candy Puller—The Union Confectionery Machinery Company, 318-322 Lafayette St., New York City, describes the American Candy Pulling Machine in a leaflet showing a factory model of the machine.

Peanut Machinery—The automatic bag filling and sealing machine and the almond and peanut blanching equipment manufactured by Julius French, 1301 Larrabee St., Chicago, Ill., are described in an illustrated leaflet.

Labeling Machine—In an eight-page booklet, the McDonald Engineering Corporation, 225 Varet St., Brooklyn, N. Y., describes its various types of labeling machines. The booklet is well illustrated with actual photographs.

Ventilating Fans—In an illustrated leaflet, the Hartzell Propellor Company, Piqua, Ohio, calls attention to its Charavay exhaust ventilating fan. The illustrations indicate the diversity of applications that this fan may have.

Chocolate Machines—An illustrated leaflet, published by Baker Perkins Company, Saginaw, Mich., calls attention to its Velvos Chocolate machine and International enrober for use in the confectionery industry.

Aluminum Products—In bulletin A-18, Metal Protection Corporation, 401 West Michigan St., Indianapolis, Ind., describes its product Alumilite. This product is the result of electrolytic treatment and coloring of aluminum.

Gas Prover—A 2,800-cu.ft. dry-type prover to be used in testing large meters in highest state of flow is illustrated and described in a leaflet published by the Connersville Blower Company, Inc., Connersville, Ind.

Non-Clogging Pump—Vertical and horizontal sewage pumps are described in bulletin D-35, published by the Lawrence Pump & Engine Company, P. O. Box 70, Lawrence, Mass. They are known as the Lawrence Vortex and Surefio Non-Clogging pumps.

Motor Truck Analysis—A detailed analysis and summary of returns to a questionnaire, sent out to truck owners on Sept. 18, 1929, has been published by the General Motors Truck Company, Pontiac, Mich. This is a 44-page pamphlet.

News of the Month

Plans Advanced at Several Conferences To Aid Cuban Sugar Industry

RECOGNITION of the fact that continual sale of sugar below the cost of production is bringing the whole Cuban sugar industry to an exceedingly precarious position has led to strenuous efforts for relief. A committee of American and Canadian bankers, sugar-company executives, and Cuban land owners met in New York under the chairmanship of Thomas L. Chadbourne during the latter part of August to find some market for the huge carry-over now on hand and to work for some way of curtailing sugar acreage in the future.

A plan to limit exports of Cuban sugar to the United States under an agreement with American growers was advanced at the conference by Viriato Gutierrez, member of the Cuban Senate, and received the commendation of a number of the delegates. Roughly stated, this plan asks that crops of U. S. beet growers, and cane planters in Louisiana, Porto Rico, Hawaii, and the Philippines, for the next three years be kept within the limits of the 1930 crop, and that during the following two years (1934 and 1935) any increase be limited to one-half the increase in consumption of sugar shown in the preceding year.

If American growers will adhere to this proposal, he said, Cuba will limit her exports to the United States so that: (a) in 1931 they will not exceed 2,800,000 long tons; (b) in 1932 they will not exceed the 1931 figure plus the increase in consumption shown from 1930 to 1931; (c) in 1933 they will not exceed the 1932 figure plus the increase in consumption shown during the previous year; (d) in each of the next two years, they will not exceed the previous year's exports plus one-half the increase in consumption shown over each of the preceding years; (e) not less than 1,000,000 long tons will be segregated from the Cuban crops of 1930 or 1931 to be sold during the five-year period, but none of it will be sold in the United States.

Immediate opposition to the plan was seen in a statement made in New Orleans by Ernest A. Burguieres, of the American Sugar Cane League of United States, who said that the larger sugar concerns of Louisiana were uniformily opposed to the curtailment program advanced by Cuban sugar interests.

The fact that the Great Western Sugar Company, largest beet sugar producer in America, refused to join in the conference because of opposition to such plans also reduces the possibility of immediate action of this sort.

The conference is said to be arranging terms with Soviet Russia for the sale of a large quantity to that country. Russia has already purchased 330,000 tons and is said to be in the market for 250,000 tons more. Previously it was reported that a co-operative organization of 43 mills had been formed to sell sugar to Russia on special terms.

Plans for curtailment of production face a great difficulty in the fact that an international agreement seems necessary if one producing region is not to become a martyr to raise prices for the others. Agreements between beet-sugar growers in United States and Cuban interests are hoped for as a result of conferences between A. E. Carlton, president of the Holly Sugar Corporation, one of the largest beet sugar manufacturers in the United States and leaders of the Cuban industry. A plan offered by Henri Brandt, of the executive committee of the National Association of Cuban Planters, which advocates close co-operation between the two groups was considered at the conference, but no results were made public.

Another group conferring on the international aspects of the overproduction of sugar includes H. C. Armstrong of Sydney, Australia, identified with the British Empire Research Association; Charles C. Krumbhaar, owner of the Houma Sugar Company of Louisiana; J. J. Naugle, president of the International Sugar Corporation; George T. Walker, president of the Matanzas Sugar Company, and Thomas H. Howell, Jr., representing Dominican sugar interests.

Meeting in Havana on Aug. 13, this group considered widening the market for sugar in Moslem countries by the use of a vegetable refining substance, inasmuch as sugar refined by bone char is taboo to Mohammedans because of religious rules.

A feature that has been attracting interest in the Cuban sugar situation is the shipment of "liquid sugar" to the United States. According to a report received last month by the Department of Commerce, almost 30,000,000 lb. of this product has been shipped from Cuba in recent months.

COMING EVENTS

SEPTEMBER

8-12—American Chemical Society, Hotel Gibson, Cincinnati, Ohio.

11-13—International Fisheries Convention, Montreal, Que.; Canadian Fisheries Association; United States Fisheries Association.

22-26—International Bakery Conference and Exposition, Atlantic City, N. J. American Bakers' Association; American Society of Bakery Engineers; Bakery Equipment Manufacturers' Association; New York State Association of Manufacturing Retail Bakers.

29-30, Oct. 1—National Chain Store Association, Chicago, Ill.

29-Oct. 3—Annual Safety Congress and Exposition, Food Section, National Safety Council, Pittsburgh, Pa.

OCTOBER

5-7—National Poultry, Butter, and Egg Association, Chicago, Ill.

15-16—American Cheese Makers' Association, Thorpe, Wis.

11-19—National Dairy Exposition and St. Louis Fair, St. Louis, Mo.

17-22—Institute of American Meat Packers, Drake Hotel, Chicago, Ill.

20-25—Dairy Industries Exposition, Cleveland, Ohio. International Association of Milk Dealers, Hotel Statler, Oct. 20-22; International Association of Dairy and Milk Inspectors, Hotel Statler, Oct. 22-24; International Association of Ice Cream Manufacturers, Hollenden Hotel, Oct. 23-25.

21-22—Associated Grocery Manufacturers of America, Hotel Traymore, Atlantic City, N. J.

27-29—Mayonnaise Products Manufacturers' Association of America, Chalfonte-Haddon Hall Hotel, Atlantic City, N. J.

Ice Cream Consumption in U. S. Shows Continued Rise

ICE CREAM production continued to increase last year and reached a grand total of 365,448,000 gal., as compared with 348,046,000 gal. in 1928, according to estimates by the Bureau of Agricultural Economics, United States Department of Agriculture, announced on Aug. 22.

Inasmuch as imports and exports of ice cream are negligible, all of the production is assumed to have been consumed. On this basis, the consumption per person last year was 3 gal. Ten years ago, the per capita consumption was a little more than 2 gallons.

Greatest increases in production last year over the preceding year were recorded in March, April, June, and September.

Flour Defined by Department Of Agriculture

DEFINITIONS and standards for flour and whole-wheat flour have recently been adopted by the Department of Agriculture as an aid in enforcing the Federal food and drugs act and as a guide to the industry. The definitions adopted were those recommended by the food standards committee, composed of representatives of the Association of Dairy, Food, and Drug Officials; the Association of Official Agricultural Chemists; and the U. S. Department of Agriculture.

Official text of the definitions and standards follows:

WHOLE-WHEAT FLOUR, ENTIRE-WHEAT FLOUR, GRAHAM FLOUR, is the clean, sound product made by grinding wheat, and contains, in their natural proportions, all of the constituents of the cleaned grain.

FLOUR, WHEAT FLOUR, WHITE FLOUR, is the clean, sound, fine-ground product obtained in the commercial milling of wheat, and consists essentially of the starch and gluten of the endosperm. It contains not more than 15 per cent of moisture, not less than 1 per cent of nitrogen, not more than 1 per cent of ash, and not more than 0.5 per cent of fiber.

Enforcement of Food Laws Is Strict in Eastern Canneries

CLOSE surveillance by the Food & Drug Administration was maintained during the year ending March 1, 1930, not only over the canning processes and raw materials, but also over the finished products, according to a report made public on Aug. 4, by W. R. M. Wharton, Chief of the eastern district. Officials of the district inspected more than 750 factories and examined about 1,500 samples of canned vegetables, including asparagus, beans, beets, corn, mixed vegetables, mushrooms, peas, pimentos, pumpkin and squash, sauerkraut, succotash, sweet potatoes, spinach, tomatoes, and tomato products.

Twenty-eight seizures, totaling more than 7,500 cases of adulterated and misbranded vegetables, were made during the year. They were followed by citations of the packers to hearings, to show why criminal prosecution should not be instituted. The more flagrant violations resulting in regulatory action were under-processing, leading to decomposition of the canned product; the use of decomposed material in tomato puree and catsup; the addition of water, seepage juice, or cyclone juice to canned tomatoes; short weight, and slack filling.

In addition to domestic canned vegetables, supervision was maintained also over imported products. A total of 250 lots of canned and dried vegetables were detained because they violated the food and drugs act.

In general the vast bulk of canned vegetables which annually finds it way to the American table is clean, wholesome, and properly prepared, said Mr. Wharton. Regulatory activities of the Department of Agriculture during past years together with the efforts of most of the canning trade constantly to improve the quality of canned goods, have established the justified confidence of the public in canned foods.

Coffee Consumption Rises; Prices Still Low

EFFECTS of the international loan to Brazil have not yet begun to be felt on the coffee market. Under the loan agreement, the State of Sao Paulo is to buy 3,000,000 bags of coffee, 1,000,000 direct from the planters in the interior and 2,000,000 from the seaports. This is to enable local interests to carry on financially while the coffee surplus of 16,000,000 bags is being liquidated. The state so far has bought about 800,000 bags of 132 lb. each.

Although market conditions are such that any large buying makes a temporary price spurt, the trend still is downward. Importers have not yet begun to buy in quantities much above their normal supply, which indicates that rock bottom has not yet been reached. Imports into the United States are increasing. For the first 6 months of this year coffee imports were substantially above the same period last year, the figure being 843,000,000 lb. against 764,000,000 in January-June of 1929. This is thought to indicate some increase in consumer demand for coffee encouraged by dropping retail prices. The coffee index is given as 135.6 for July, 147.0 for January, and 166.1 for January, 1929, a steady recession.

The Business Outlook For September

IN SPITE OF (and, in some cases, because of) this summer's drought, faint signs of general business recovery are now evident. The business index computed weekly by *The Business Week*, which stood at 87 per cent for the period ending Aug. 23, stood at 89 per cent for the period ending Aug. 30.

Steel activity, coal production, and carloadings are up more than seasonally; electric power output is increasing slowly; building is resisting seasonal decline; general trade volume is rising nearer to normal levels; and commodity prices have ceased their rapid decline. Whether this upturn is to carry beyond September and bring things near to normal by the end of October depends largely upon whether business brains jump energetically into the job.

Butter Production Hit By Drought

A DECREASE of 22,000,000 lb., or 11.7 per cent, in butter production for July, 1930, as compared to the same month in 1929 was ascribed to drought and heat by L. M. Davis, of the Bureau of Agricultural Economics, in a radio address on Aug. 26. Other dairy products were also hit, he said, but not to so marked a degree.

For the first six months of the year, butter production has fallen 47,000,000 lb. below last year's figures, and storage stocks of butter were 6,500,000 lb. below last year on Aug. 1, after being considerably higher during the first part of 1930. The change from a net into-storage to a net out-of-storage movement occurred two weeks earlier than last year, Mr. Davis pointed out, and there has been a decided change in the status of the storage situation. Mr. Davis intimated that further advances in price would probably take place, the principle unfavorable influence which may affect the price situation being danger of a reduction in consumer demand.

"Sub-Zero Ice" Arrives From Mexico

A SHIPMENT of 150 tons of solid carbon dioxide made from a natural CO_2 well in the Tampico district of Mexico arrived in New York City on Aug. 19 aboard the steamship *Panuco*. This is the first of a number of experimental shipments to be made on this and two other vessels of the New York-Cuba Mail Line by the Carbonic Products Company, New York City, to determine the most advantageous methods for transporting the refrigerant from the plant recently erected at the source of supply.

The CO_2 supply was discovered accidentally some years ago by the Globe Petroleum Company while drilling for oil, but it was only recently that the growing use of solid CO_2 in the refrigeration of frozen foods indicated its value as a commercial development. The gas is said to come to the surface under a pressure of 1,000 lb. per square inch and to be available in sufficient quantities to produce 1,600 tons of solid CO_2 daily. The present plant has a capacity for purifying and solidifying 40,000 lb. per day.

The thickest installation on record for high grade commercial insulation—a foot of corkboard—is used to insulate the compartments in which the blocks of "sub-zero ice" are stored during their nine-day voyage from the tropics. The present compartments have a capacity of 200 tons of the product, but these are tests of minimum, rather than maximum shipments, according to P. J. Reilly, president.

A special storehouse, also insulated by 1 ft. of corkboard has been erected on Pier 15, Brooklyn, for the storage of the refrigerant.

Effects of Drought on Canning Crop Offset Increased Acreage

By Paul Wooton
Washington Correspondent

THE crop losses caused by the drought appear to have more than offset the effects of increased acreage planted this Spring. Although the principal canning vegetables are, with the exception of corn, still above the 1924-28 average, they are sufficiently below 1929 figures to threaten a halt in the yearly upward trend in canned food production.

Canners and some preservers who have held off on their buying for this year's pack are facing a very uncertain produce market. Due to the increased acreage this spring, there was some tendency earlier in the season to avoid future commitments in anticipation of price drops. The drought points toward higher prices and perhaps some difficulty in securing the desired quantity and quality for those who will have to go into the spot market for their requirements. But this theory is by no means certain to work out. Those concerned are simply looking at each other and wondering what is going to happen. Effects of the drought extend over such wide areas and are so spotty that experts are free to confess that they do not know what to expect of the market in the future.

To the extent that wholesale prices of canned vegetables have been depressed by this large surplus production in prospect earlier in the season, an increase in price levels is regarded as justifiable. With a production probably below last year's output, the canners, in the opinion of official marketing experts, have every right to erase the price spread that persisted well into the month of August. On July 1, 1929, wholesale quotations on canned beans ranged from 18 to 33 per cent above prices on July 1 this year. Corn was 11 to 43 per cent higher; peas were the same or slightly lower, and tomatoes were 33 to 54 per cent higher.

Some impetus has been given to prices by the public demand for unusually large amounts of canned goods resulting from apprehension concerning the supply. This increase also reflects a shortage in home and market garden supplies in central and eastern states. The shortage in home garden supplies is expected to result in large consumption of canned goods on farms this winter. Because of the checkered character of the drought, many canning plants were affected little if at all, while others were forced to curtail operations or to shut down entirely. The disposal of carry-over stocks from last season at prices reflecting the interplay of these various factors will give some support to the latter group.

The carry over of canned corn and peas last January compared favorably with stocks in preceding years. Corn totaled 11,486,754 cases on Jan. 1 against 10,749,942 on the corresponding date of 1929, and 12,198,100 in 1928. Canned pea stocks at the opening of 1930, 1929, and 1928 totaled respectively 10,387,962 cases, 10,859,554 cases, and 11,504,565 cases. Stocks of tomatoes were considerably larger last January than a year ago, totaling 6,885,566 cases as compared to 5,557,137 last year, but were short as compared to the January 1928 total of 9,009,728. In terms of the average production for the five-year period from 1925 to 1929 inclusive, which is an indication of the normal demand, stocks of canned corn on Jan. 1, 1930 represented 70 per cent and tomatoes 55 per cent.

The yield of all fruits is plentiful as compared with last year's short crop but is about 10 per cent less than the ten-year average. The largest portion of the country's fruit supply is grown outside the area of greatest drought damage, and these crops for the country as a whole have not been affected very seriously. The yield on Aug. 1 was expected to be about 18 per cent above last year. The greatest percentage increase is in prunes and plums, largely grown in California. The California fruit crops in 1929 were reduced sharply by freezes and, with the favorable conditions prevailing in that state during the present season, the increase above 1929 has been most marked. Drought has not been the determining factor in this year's peach crop. Severe winter injury and spring freezes occurred in many sections and on Aug. 1 a crop of 47,000,000 bu. was indicated, or about 2 per cent more than the 1929 harvest, and slightly more than 80 per cent of the five-year average.

Forecast at 30,722,000 bbl. on Aug. 1, the commercial apple crop would be about 6 per cent more than last year and about 5 per cent less than the 1924-28 average. With the short crop now in prospect and the short general farm crop it is probable that a larger proportion of the crop will move in commercial channels this year than usual. In the Cumberland-Shenandoah region and in the Ohio valley apples have been seriously injured by the drought. It is expected that less than a fourth of a crop of apples will be harvested in Virginia.

The pear yield forecast at 24,277,000

Latest Reports Show Smaller Crops

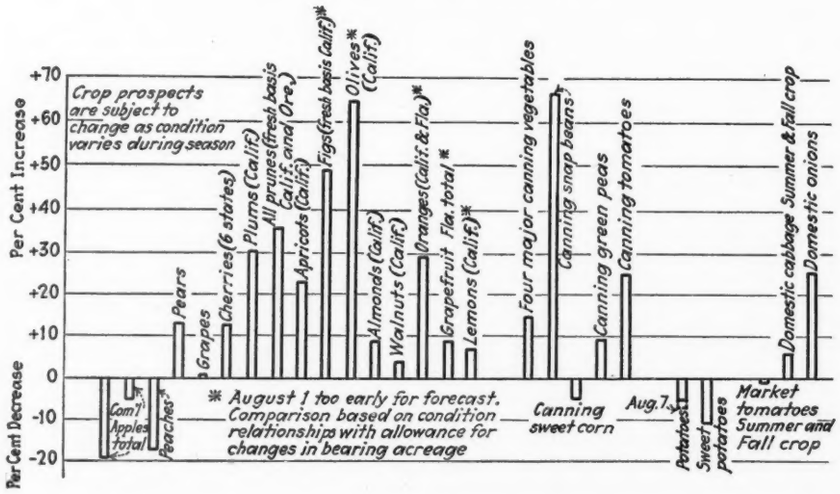
FURTHER downward revisions in forecasts of production of canning crops of sweet corn, tomatoes, and snap beans were announced on Aug. 23 by the U. S. Crop Reporting Board. These revisions modify to some extent the prospects shown in the accompanying graphs.

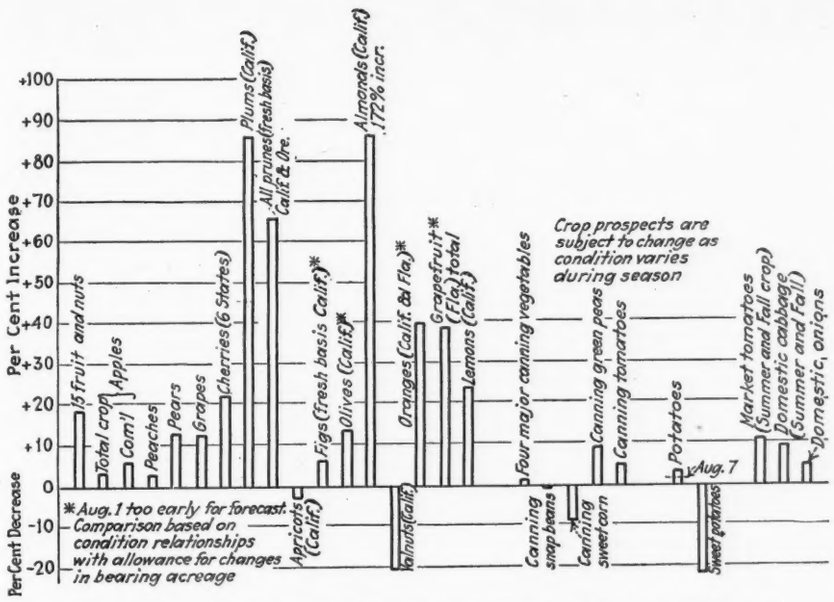
Production of sweet corn for canning or manufacture, based upon prospects on Aug. 15, is forecast at 589,500 tons as compared with a forecast of 641,200 tons on Aug. 1, and with 703,600 tons produced last year. The acreage planted this year was 11 per cent larger than in 1929, but the yield is the lowest on record for the last 10 years.

Tomatoes are forecast at 1,366,330 tons compared with 1,449,430 tons forecast on Aug. 1, and an estimated production of 1,426,170 tons last year. The crop is somewhat smaller than last year's, but the production is 14 per cent more than the 5-year average for the period 1924-28.

Production of snap beans is forecast at 79,850 tons as of Aug. 15, against 90,020 tons on Aug. 1, and a crop of 90,430 tons produced last year. The indicated production is nearly one-half larger than the 1924-28 5-year average.

1930 PRODUCTION PROSPECTS on Aug. 1, expressed as percentage of estimated average production from 1924 to 1928





1930 PRODUCTION PROSPECTS on Aug. 1, expressed as percentage of estimated 1929 crop

bu. would be about 13 per cent larger than the 1929 crop and the average for the 5 years. The cherry crop was even better than earlier anticipations. The Aug. 1 forecast placed the yield at 59,682 tons, which is 21 per cent over the 1929 crop and 12 per cent over the five-year average. The crop of California apricots is estimated at 209,000 tons, approximately 3 per cent under last year's crop, but 23 per cent over the five-year average production. The total canned is about the same as in 1928. The amount dried is still indefinite. Much small sized fruit in drying sections has been wasted because of poor prices offered or in prospect.

Mayonnaise Survey Now Under Way

A SURVEY of the mayonnaise industry to add production and distribution statistics for 1929 to data assembled last year is now being carried on by the Foodstuffs Division of the U. S. Department of Commerce at the request of the Mayonnaise Products Manufacturers Association.

Questionnaires have been sent to about 500 manufacturers requesting the information. Emphasis is laid upon the fact that all replies will be held strictly confidential, and only general totals and averages for the industry as a whole will be made public. Included in the information sought in the survey are the following: Volume and value of 1929 production of mayonnaise and salad dressing; the proportion packed in various size jars; the proportion sold under manufacturer's brand, under buyer's labels, and unlabelled; the proportion going to various distribution channels, such as direct to retailer, to wholesale grocers, to chain stores, or in other ways. Request is also made for the period of peak production.

Exports of Apples Involved In Foreign Rulings

IN SPITE of strenuous protests sent by Secretary of State Stimson and others conveyed by Ambassador Dawes, the British Government will not lift the embargo on certain grades of American apples, the State Department recently informed the U. S. Department of Agriculture. The embargo, which is in effect from July 7 until Nov. 15, prevents the shipment to the United Kingdom of any barreled apples below the grades of "U. S. Fancy," and "U. S. No. 1," and boxed apples below the grades of "Extra Fancy," and "Fancy." According to the original note, the purpose of the ban is to exclude the apple fruit fly, several cases of infestation having been reported last January.

A number of charges that the ruling has its origin in other reasons than that of insect infestation have been made. It is contended that the pest exists only in the Northeastern part of the country, and not in the Middle West, on Pacific Coast or in Virginia, from which many of the apples are shipped. Furthermore, inspection of apples going to the United Kingdom is now made by the Department of Agriculture previous to shipment, and no case of infestation has been found since such inspection was inaugurated. Apparently, none of these reasons have impressed the British Government sufficiently to make it cancel the decree.

A modification has been obtained, however, of the decree made by the Argentine Government on May 14 requiring that all apples sent to that country be packed in boxes rather than barrels. After the American Embassy conveyed protests telling of the difficulties of complying with the decree, the President of Argentina announced on Aug. 11, that importation in barrels would be permitted during the current year.

Food Racketeering Prevalent In New York City

ORIGINALLY a byproduct of the dustry to add production and disfood profiteering in New York City have resulted in a number of spectacular disclosures regarding the use of "racketeer" methods to maintain prices. Milk, flour, and poultry products are the commodities that have been in the spotlight during the hearings up to Aug. 27. Two investigations, one centering on milk before Referee Charles C. Johnson, and one on general food prices before Referee John Holley Clark, Jr., are being pushed by the State Attorney General, with Assistant Attorney General William B. Groat taking the lead in the work up to the present time.

An alleged "milk ring" which has prevented the purchase of loose milk by retailers below $4.40 for a 40-quart can by threats of bodily harm, by doping of the milk, and other violent methods, is costing milk purchasers in the city over a million dollars a week, it is charged. Borden's Farm Products Company and Sheffield Farms Company, the two large milk distributors in the city, are in no way involved in the trouble. It is the 2,750,000 quarts of loose milk going to a multitude of smaller distributors each day that has become the bone of contention.

A rise in the price of loose milk going to retailers to 11c. a quart was instituted on Aug. 11 with the drought as an excuse, it is charged, and dealers who continued to purchase milk at lower prices from sources outside the "ring" were threatened. Several such dealers testified that their milk had been ruined by "doping," or that price wars in which milk was given to their competitors free of charge were started against them to compel them to acquiesce.

The Dairymen's League, the co-operative which dominates the wholesale milk market in this section, has been charged with various unfair trade practices by Aaron Sapiro, counsel for the Harlem and Bronx Milk Dealers' Association. Because the league extends into 7 states, a petition charging violations of the anti-trust laws has been filed with the Federal Trade Commission, in addition to the action being sought at the State hearing.

Flour prices are said to be maintained at an unjustifiable level by the Associated Flour Jobbers, Inc., working through the New York and Brooklyn Flour Truckmen's Association. The latter organization, according to revelations at the hearings, advanced the cost of trucking flour 66 per cent, and then assessed member trucking companies a large monthly "organization" fee and a cent on each barrel of flour carried. Several witnesses who refused to join the organization or who hauled flour at cheaper rates were so badly beaten that they were taken to hospitals unconscious, they testified. Jobbers who did not pay the dues of the jobbers association were unable to obtain truckmen, witnesses contended.

Frame Regulations for New Marketing Law; Canners' Bill May Not Affect 1930 Crop

REGULATIONS governing the Perishable Agricultural Commodities Act (Borah-Summers Law) are approaching final form and will be available by October according to present plans. The purpose of this law, effective Dec. 10, is to license commission merchants and brokers engaged in interstate commerce with fresh fruits and vegetables, including products frozen or packed in ice. A series of hearings recently held in New York and Chicago between members of the trade and officials of the Department of Agriculture leave the tentative regulations essentially unchanged. A central staff has been organized in Washington to administer the system which will include issuing about 40,000 licenses at a fee of $10 per year.

Already some complaints have been received, although the new law is not yet wholly operative. The Department has been able to adjust most of these by acting as an intermediary. After the system goes into effect, the law gives powerful forces of moral as well as legal suasion by the option of publishing findings of unfair practices and by the suspension or revocation of licenses. To operate without a license is subject to a penalty up to $500 for each offense plus $25 per day, recoverable by the government under civil court procedure.

Dealers in produce wholly of their own raising or retailers whose gross purchases do not exceed 20 carloads per year or the equivalent are exempt from licensing. Final policy governing canners and preservers has not yet been announced. It is fairly obvious that some firms engaged in the resale of surplus produce will be required to sign up but no figures are available to show how many companies will be so affected. Canners are outside the main intent of the law, which is aimed at unfair dealer practices such as failure to deliver or accept goods under contract, fraudulent charges, misrepresentation, and the like.

Licensees will be required to keep full records of all transactions and to keep them for inspection for two years after the deals in question. However the Department does not contemplate the laying down of a uniform system of accounts. The regulations will, of course, be subject to later court decisions if challenged, but the hearings brought out no serious contentions.

With the substandard canning act on the books for two months, progress is being made toward an enforcement code, but it is undoubtedly a long-time job. This year's pack is not likely to be affected except in some instances through next year's carry over, and then only after ample forewarning. The result should be wholly constructive and without seriously upsetting effects, according to competent opinion in Washington. There has been some apprehension that, due to the broad powers of the act, some firms might produce or purchase goods which would be adjudged substandard after the promulgation of regulations.

From the present outlook, little trouble is expected from this source. As regulations are developed, 90-days notice and hearing privileges must be given before substandard labeling is compulsory against any given product. Jurisdiction covers only goods in interstate commerce and does not include products which have reached final destination before enforcement of the law. These conditions seem to give producers and distributors ample time to make necessary adjustments.

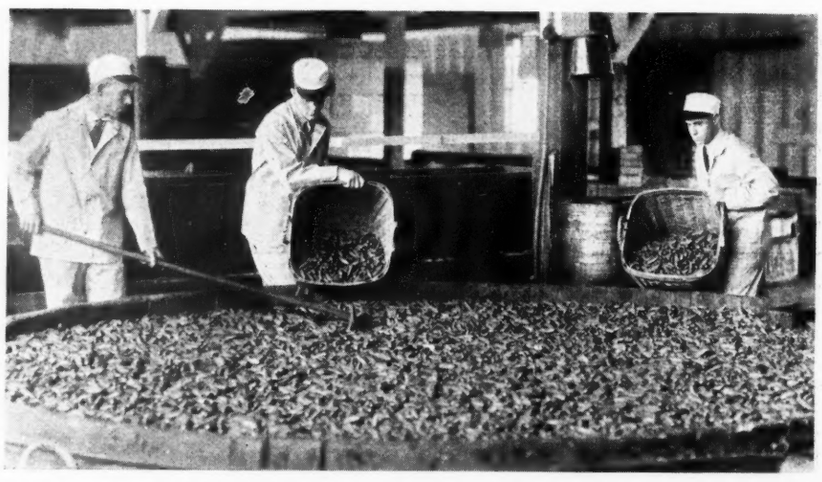
Meanwhile, the Food and Drugs Administration is calling on all interested parties, including manufacturers, associations, and organized consumer groups, to arrive at the fairest possible basis for standards. Officials of the Department of Agriculture are faced with the complex problem of determining what marks of excellence go to make a grade high or low. The act covers "all food which is in hermetically sealed containers and sterilized by heat," excepting meat and meat products, which are under other laws, and excepting canned milk. Obviously this includes a wide range of canned fruits and vegetables plus some products put up in glass. Since it would be physically impossible to lay down precise and fair standards for the whole field at once, a start is being made with 4 or 5 of the most important vegetables and a like number of fruits. Exhaustive tests will be made from a large number of samples.

It seems a singular occurrence that the bill should be handed to the Department of Agriculture for administration at a time when many canners will be faced with the necessity of either closing their plants or putting up marginal stuff of a kind that they normally would not think of using because of the drought.

Some of the canning plants in the drought-stricken sections are turning to other crops upon finding that the crop they desire to put up was either destroyed or injured. Reports have been received, however, that the quality of the vegetable and fruit crops in certain districts has been affected by the drought and that the canning plants in these districts will either have to put up marginal stuff or else suspend operations.

Some months from now, when substandard labeling for some products is in imminent prospect, the industry will have the problem of educating the public to understand that a substandard item is not unwholesome or adulterated because in that case it would be banned by the pure food laws. Substandard foods simply will be less tasty, less tender, or in other ways less desirable than those up to the mark which will be set. It is not yet clear whether the law may lead to the eventual elimination of goods falling below the line, or whether such goods will persist and be featured because of their cheapness.

Story of Pickles Goes on the Air



Cucumbers going into a 1,000-bu. tank of H. J. Heinz Co.

A COAST-TO-COAST hook-up of 38 broadcasting stations in the Columbia network presented "The Surprising Story of Pickles" to radio listeners on Aug. 30. The address was delivered by C. M. Walters, of Libby, McNeill, & Libby, and was sponsored by the National Pickle Packers Association. In addition to interesting angles in the production of pickles, such as that shown in the photograph, Mr. Walters sketched the history of pickles in the diet of mankind and emphasized their place on the modern table. An extensive advertising campaign to foster the consumption of pickles is now being contemplated by the association.

Quick-Freezing Methods Involved in Patent Suit

A SUIT asking for an injunction, an accounting, and damages for infringement of patents was filed against General Seafoods Company on Aug. 11 by Paul Willer Petersen, of Chicago, Ill., who holds nearly a score of patents on various phases of freezing foods. The suit was filed in the U. S. District Court, District of Massachusetts. General Seafoods Company, the subsidiary of Frosted Foods, Inc., and General Foods Corporation which makes use of the Birdseye system of quick-freezing at its plant in Gloucester, Mass., is charged with infringing U. S. patent No. 1,681,009 and U. S. reissue patent No. 15,683. The former deals with processing of fish previous to freezing, and the latter with the actual freezing method.

The suit will be of major interest to all concerned with the "indirect-brine" methods of freezing foods, for Mr. Petersen's claim, if upheld in full, would give him control of all methods of freezing foodstuffs in which compactly packed comestibles are refrigerated by brine on the opposite side of a metal wall. This would include other well-known systems in addition to that used by General Seafoods.

Cold Storage Holdings Show Varying Trends

STOCKS of frozen and cured meat in storage on Aug. 1 were less than a year ago and less than the average on that date for the last five years, the U. S. Department of Agriculture announced on Aug. 12. Meats totaled 810,974,000 lb. compared with 943,991,000 lb. last year and 868,734,000 lb. for the five-year average. Frozen beef totaled 46,020,000 lb., almost 15,000,000 greater than last year and almost twice the five-year average figure. Frozen lamb and mutton in storage was also above the former figures, but there was a drop in holdings of frozen pork from 229,397,000 lb. to 157,842,000 lb. since last year.

Holdings of frozen fish on July 15, were greater than last year by a considerable margin, according to a report of the Bureau of Fisheries. A total of 64,847,444 lb., against 51,663,704 lb. last July 15 and 46,596,000 lb. as the five-year average on that date, is shown in the figures. More than 5,000,000 lb. of haddock fillets were in storage, the report reveals, but no comparison with former years is possible because fillets were not separately classified until this year. The report shows, however, 2,474,666 lb. of haddock fillets were frozen from June 15 to July 15.

Stocks of frozen poultry on Aug. 1, were 46,890,000 lb. compared with 40,896,000 a year ago. Case eggs were 11,202,000 cases compared with 8,962,000 last year, frozen eggs 116,358,000 lb. compared with 91,488,000 lb. a year ago.

TRADE NOTES

D. AUERBACH & SON, New York City, which passed into the hands of the receivers on Aug. 11, has sufficient assets to pay all creditors in full, it is reported. Since the bankruptcy action, the entire sales force of the organization, with the exception of the sales manager, J. T. Flahiff, has been released.

WALTER BAKER & COMPANY, INC., Boston, Mass., is celebrating its 150th anniversary by the introduction of new chocolate bars in several centers throughout the country. It has also introduced a new line of milk chocolate coatings that are reported to find a ready market.

CASCADE CANNING COMPANY has been organized and acquired the Wenatchee Canning Company, Wenatchee, Wash. Ira D. Cardiff, Yakima, Wash., is president and D. J. Matthews, is manager in the new organization.

CALIFORNIA PACKING CORPORATION is planning to can grapefruit and grapefruit juice in a new plant to be erected in Tampa, Fla., in the near future, it was recently announced. The Florida branch is to be operated by a separate corporation known as the Florida Packing Corporation, but general headquarters are to remain in San Francisco.

CHALLENGE CREAM AND BUTTER ASSOCIATION, UNITED DAIRYMEN'S ASSOCIATION, and INTERSTATE ASSOCIATED CREAMERIES have completed an agreement by which most of the butter marketed on the Pacific Coast will come under centralized co-operative control, it was announced on Aug. 20.

CRYSTAL GELATINE COMPANY, Boston, Mass., on Aug. 9, took over in its entirety the Essex Gelatine Company. The management and selling organization of the latter concern will continue to function as the Essex Division of the Crystal Gelatine Company, and the specific brands and markings of the Essex Company will be continued. Technical research on a much larger scale will be instituted by the combined organizations, it is reported.

DELICIOUS CANDY FACTORY, San Francisco, Calif., have just commenced the manufacture of candies of all kinds, specializing in chocolates. Their office and factory are located at 418 Valencia St.

GREAT ATLANTIC & PACIFIC TEA COMPANY has instituted a suit asking damages of $1,000,000 in the U. S. District Court at Cincinnati, Ohio, against J. Henry Koenig Company, wholesale tea, coffee, and spice dealers. It charges that the "Eight Bells" coffee packed by the latter organization was so named to benefit from the reputation of the "Eight O'Clock" coffee put out by A. and P.

GROCERY STORE PRODUCTS, INC., has organized a subsidiary, the Golden Age Corporation, to carry on the operations of the Golden Age Macaroni Company of Joliet, Ill., which it recently acquired. The macaroni company was the fourth business that Grocery Store Products had purchased within a year, the others being E. H. Jacobs, Inc.; the Kennett Square Mushroom Company, Inc., and Yuban Coffee, Inc.

HORLUCKS, INC., a Seattle, Wash., firm, operating numerous retail malted milk shops, has been held not to be infringing upon the trademark of the Horlicks Malted Milk Corporation, of Wisconsin. The latter organization brought suit against the Seattle firm about 18 months ago, charging infringement of the trademark. George Horluck, president of the corporation operating the retail stores, and his father, H. J. Horluck, held that there was no infringement and that they had a right to use their family name in their business.

KROGER GROCERY AND BAKING COMPANY will operate the general grocery, meat, and produce departments in two department stores of Sears, Roebuck & Company in Chicago, Ill., it was announced on Aug. 23. This merchandising innovation will, if successful, be extended to other retail stores in the Sears-Roebuck chain.

LIBBY, MCNEILL & LIBBY is remodeling its fruit and vegetable canning plant at Sunnyvale, Calif.

LOOSE-WILES BISCUIT COMPANY, Cincinnati, Ohio, has announced that Green & Green Company, bakers of Edgemont crackers, Dayton, Ohio, which was merged with the former organization about a year ago, will be made the key manufacturing and distribution center for Loose-Wiles crackers in that district.

MILK INDUSTRIES, INC., Harrisonburg, Va., was recently organized with an authorized maximum capital stock of 30,000 shares of common of no par value and $500,000 of preferred. The new corporation is authorized to buy, sell and deal in milk products. J. M. Rothwell of Charlottesville, Va., is president and treasurer, and W. A. Pollard of Richmond, Va., is secretary of the new organization.

NATIONAL DAIRY PRODUCTS CORPORATION, New York City, announced on Aug. 4 that it had taken group life, accident and sickness insurance for 35,000 employees in more than 160 subsidiaries throughout the United States. This is said to be the largest group policy issued this year, involving $50,000,000 life insurance and more than $500,000 weekly benefit for sickness and non-occupational accidents. New employees are qualified for insurance under this plan after completing 6 months of service. Liberal benefits are provided ranging upwards from a minimum of $1,500 life insurance, and $15 per week sickness benefit, depending upon the employee's earnings.

PAGE & SHAW, INC., Boston, Mass., well-known candy manufacturers and retailers, filed a voluntary petition in bankruptcy on Aug. 20 in the Federal Court. The company's liabilities are said to exceed $300,000. Its assets have been placed at about $200,000. This is the final step in a series of difficulties which have involved the organization over a period of about six months. Company officers are now under indictment charging irregularities in the sale of stock, and the trial of the 18 defendants in this suit has been set for Oct. 6. Considerable criticism also arose some months ago, when the company offered one share of Class A stock free with each purchase of a $2 package of its candy. Hugh D. McLellan has been appointed receiver for the company.

PROCTER & GAMBLE COMPANY paid dividends of more than $900,000 for the twelve months ending June 30 to employees in its profit-sharing system, it was announced on Aug. 7. This was the largest sum ever paid to them in a year since the plan was inaugurated in 1887. The company has also a system at its plants whereby employees are assured a minimum of 48 weeks work a year with full pay.

SANTA CATALINA mill, one of the most valuable sugar properties in the Santa Clara Province of Cuba, was completely destroyed by fire on Aug. 5. About 300,000,000 lb. of raw sugar was burned, and 50 company houses used by officials were also leveled before the blaze could be checked.

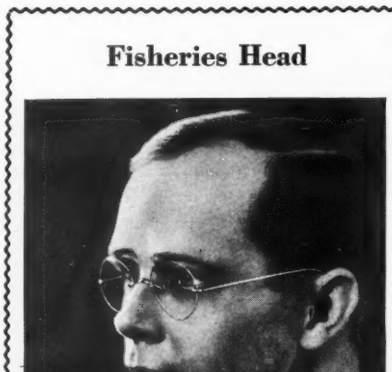
SWIFT & COMPANY are planning to embark upon one of the largest food-products advertising campaigns ever used on the West Coast to introduce a new shortening in California. The product will be manufactured in Swift's new $2,000,000 California plant, it was said.

TODDY, INC., plan to establish a manufacturing plant at Buenos Aires, Argentina, a corporation to be known as the Toddy Company of Argentina having been incorporated in Delaware. The Toddy organization, which manufactures a chocolate malted beverage powder, is a subsidiary of Grocery Store Products, Inc.

UNITED STATES DAIRY PRODUCTS CORPORATION announced recently the acquisition of the following companies: Janssen Dairy Products Co., Hoboken, N. J.; Janssen Dairies, Inc., Carlstadt, N. J.; Kligerman's Alderney Dairies, Atlantic City, N. J.; Meadowbrook Dairies, Staten Island, N. Y.

VERLE WENE, INC., Columbus, Ohio, has been formed and engaged in the manufacture and distribution of chocolates in that city. Verle Wene, formerly with Morehouse & Martens Dry Goods Co., Columbus, Ohio, has been elected president. Dwight Metzer is vice-president and general manager. While the new firm expects to specialize in chocolates, it will also manufacture peanut brittle and other candies.

Fisheries Head



HARDEN F. TAYLOR, well-known authority on frozen foods, who was elected president of the Atlantic Coast Fisheries Company, manufacturers of "Nordic" brand frozen fish products, on Aug. 28. Formerly vice-president in charge of scientific research, Mr. Taylor succeeds F. W. Bryce, who recently resigned.

PERSONALS

FRANK CRIST, formerly with the Eline Chocolate Company, Milwaukee, Wis., has joined the Eatmor Chocolate Co., Pittsburg, Pa., as supervisor of confectionery manufacture.

JAMES C. & JOHN DEMARCO have organized the Great Lakes Canning Company as a partnership to build and operate a fruit and vegetable cannery at Farnham, N. Y.

SAMUEL G. GORSLINE, Chicago, Ill., has been elected secretary-treasurer of the Canning Machinery & Supplies Association to fill the vacancies created by the resignation of the treasurer, Mr. Thomas A. Scott and the secretary, Mr. John A. Hanna. Mr. Gorsline recently became head of the Automatic Home Can Sealer Company, which makes and sells can sealers for home use. He was formerly connected with the laboratory of the American Can Company, and previous to that had been sales engineer for the Anderson-Barngrover pressure cooker in the Chicago district. Mr. Hanna was unanimously appointed manager of exhibits by the board of directors of the association.

EDWARD A. HOYT, for four years the sales manager of the French Sardine Company, Terminal Island, Calif., resigned on July 15. A successor has not yet been appointed.

STROUD JORDAN, who recently became managing director of the Applied Sugar Laboratories, Inc., New York City, has resigned as chief chemist of Henry Heide, Inc., but will continue to serve the latter organization in an advisory capacity. R. E. LINEHAN, who was Dr. Jordan's assistant for a number of years, was named chief chemist of Henry Heide on Aug. 15.

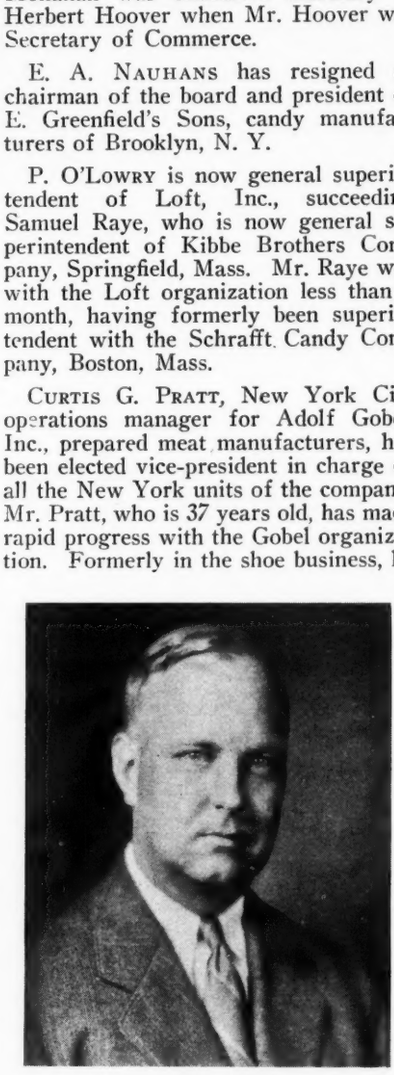
FRANK E. LUBY, JR., for five years superintendent of J. F. Inds' Milling Co., Belleville, Ill., resigned on Aug. 15.

LEO C. MONAHAN, formerly vice-president of the California Vineyardists' Association is now sales manager of the North Ontario Packing Co., Los Angeles, Calif. This organization manufactures jams, jellies, conserves and marmalade. Before he joined the California Vineyardists' Association, Mr. Monahan was executive secretary to Herbert Hoover when Mr. Hoover was Secretary of Commerce.

E. A. NAUHANS has resigned as chairman of the board and president of E. Greenfield's Sons, candy manufacturers of Brooklyn, N. Y.

P. O'LOWRY is now general superintendent of Loft, Inc., succeeding Samuel Raye, who is now general superintendent of Kibbe Brothers Company, Springfield, Mass. Mr. Raye was with the Loft organization less than a month, having formerly been superintendent with the Schrafft Candy Company, Boston, Mass.

CURTIS G. PRATT, New York City operations manager for Adolf Gobel, Inc., prepared meat manufacturers, has been elected vice-president in charge of all the New York units of the company. Mr. Pratt, who is 37 years old, has made rapid progress with the Gobel organization. Formerly in the shoe business, he



Curtis G. Pratt

joined the company this spring and was assigned to the New York sales division. The company recently made an innovation in the sale of prepared meats by establishing a printed index of current prices to be mailed to dealers each week. This list has been most successful in abolishing the evils that secret price concessions have created in the industry.

M. J. NEWHOUSE, representative of the United States Farm Board during the campaign to sign up raisin growers

in the co-operative organization, has been appointed general manager of the California Peach and Fig Growers' Association. The past affiliations of Mr. Newhouse include the organization several years ago of the Northwest Prune Growers' Association at Portland, serving as manager. He left that organization to join the U. S. Department of Agriculture and was sent to Europe on a survey of dried fruit conditions.

H. M. RANCK was recently made field secretary of the National Macaroni Manufacturers' Association, to maintain contact with the subscribers to the national macaroni advertising campaign now being carried on. He is now on a tour throughout the eastern states. Among Mr. Ranck's former connections was that of sales promotion manager for the Chicago branch of the Whitman Candy Company.

J. J. WILLAMAN, chief of the chemistry division of the New York State Agricultural Experiment Station, has accepted a position as biochemist with Rohn & Haas Company, Philadelphia, Pa.

OBITUARY

L. F. GRAHAM, manager of J. H. Flickinger Co. from 1897 until about a year ago, died recently at his home in San Jose, Calif. When the Canners' League of California was organized in 1905, Mr. Graham was elected the first president. He was 73 years old.

KENDRICK K. KELLEY, vice-president and director of the Nu-Grape Company of America, and a well-known wholesale grocer, died at Atlanta at the age of 64 on Aug. 14.

FRANK KINSEY, president of the American Key Can Company, Chicago, Ill., died a short time ago at the age of 82. Mr. Kinsey, who was the inventor of the keyless can, became president of this organization in 1901.

WILLIAM G. KRUG, for 35 years manager of the Canton (Ohio) branch of Armour & Company, and affiliated with the organization for almost 40 years, died on Aug. 10.

JACOB MAKOFF, for 40 years in the bakery business in Cleveland, Ohio, died on Aug. 6, at the age of 62.

WILLARD G. ROUSE, Easton, Md., who helped to organize the National Canners' Association in 1904 and served as president for three years, died July 31 after a long illness. Mr. Rouse had engaged in canned goods brokerage at Easton and had also practiced law.

CHARLES RUGGLES, eccentric lumberman and salt manufacturer, died at his home in Manistee, Mich., on Aug. 21. He was 84 years old and was reputed to have left a fortune of $50,000,000. Mr. Ruggles lived alone in small quarters over his office, prepared his own meals and cleaned his own rooms. Last winter he was involved in a $5,000,000 litigation with John F. Rademaker, with whom he had formerly formed the salt manufacturing firm of Ruggles & Rademaker, but the action was settled after several days of court testimony.

GEORGE GRANBY SANBORNE, founder and president of the Sanborne Coffee Company, died on Aug. 20, at his home in Philadelphia. Mr. Sanborne was 78 years old.

GEORGE SPENSLEY, assistant manager and superintendent of the Pan Confection Factory, National Candy Co., Inc., Chicago, Ill., died on Aug. 10. Mr. Spensley was associated with this organization for about 30 years, and was 60 years of age.

EDGAR M. THACKER, a director of the Dayton Spice Mills, Dayton, Ohio, died at his home in that city on Aug. 8. He was 61 years of age. Mr. Thacker had served as president of the American Board and Box Company, and for a number of years assisted his father in conducting the M. Thacker Company, wholesale grocers.

AARON UNGER, New York candy manufacturer, died at Lansdowne, Pa., on Aug. 10, at the age of 48. Mr. Unger's death brought to an end several months of court litigation. He had been ill for nearly two years and was recently declared mentally incompetent by a New York court. It was charged by his immediate family that he was being kept a captive by Miss Amelia Phillips, former actress.

New Construction

Bakery—Butterkake Co., 1034 South 57th St., Philadelphia, Pa., awarded contract for a 1 story, 50 x 250 ft. bakery at Greenway and 69th St. to Farrell Roth Co., 21 South 46th St., Philadelphia.

Bakery—Freihofer Baking Co., 20th and Indiana Sts., Philadelphia, Pa., will soon award contract for the construction of a 1 story, 30 x 280 ft. bakery. Estimated cost $75,000. C. B. Comstock, 122 East 42nd St., New York, N. Y., is architect.

Bakery—Love's Biscuit & Bread Co., Honolulu, T. H., plans a 3 story bakery. Estimated cost $300,000.

Bakery—M. & L. Baking Co., 502 West 3rd St., Sioux City, Ia., plans the construction of a 2 story, 50 x 150 ft. bakery on West 7th St. Estimated cost $100,000. E. R. Swanson, 506 Insurance Exchange Bldg., Sioux City, is architect.

Grocery Plant—Milwig & Leitch Corp., 1533 Gorsuch Ave., Baltimore, Md., will not construct 3 story addition to bakery at 1640-44 Gorsuch Ave. Owens & Sisco, Continental Bldg., Baltimore, Archts. Project in abeyance.

Bakery—J. J. Nissen Baking Co., 63 Washington St., Portland, Me., awarded contract for the construction of a 2 story bakery to P. P. Carey, 40 Main St., Waterville. Estimated cost $40,000.

Bakery—S. Piantedosi, 83 Main St., Everett, Mass., is having plans prepared for a 1 story bakery on Main St. Estimated cost $40,000 to $50,000. Private plans.

Bakery—U. S. Government, A. W. Parker, Constructing Quartermaster, Schertz, Tex., will soon award contract for a 1 story, 30 x 60 ft. bakery, etc. at Randolph Field, 14 mi. north of San Antonio. Equipment will be required.

Bakery Addition—Papendick Bakery Co., 3500 North Florissant St., St. Louis, Mo., awarded contract for a 1 story, 150 x 156 ft. addition to bakery to Acme Construction Co., Railway Exchange Bldg., St. Louis.

Bakery and Warehouse—S. Cole, 235 Blue Hill Ave., Dorchester, Mass., is receiving bids for a 1 story, 55 x 100 ft. bakery and warehouse. Estimated cost $40,000. Schein & Levine, 333 Washington St., Boston, are architects.

Distribution Plant—National Biscuit Co., 129 Franklin St., Cambridge, Mass., awarded contract for a 1 story distribution plant at Oak Grove District Malden to John MacDonald Construction Co., 250 Stuart St., Boston. Estimated cost $40,000.

Steam Oven, Steam Box, Etc. — Ridgway Baking Co., c/o City Baking Co., Bellefonte, Pa., C. M. Thompson, Purch. Agt., wants prices and information on steam oven, boiler steam box and repairs to present machinery for new 50 x 100 ft. plant. Estimated cost $15,000.

Bottling Plant — Aberdeen Bottling Works, Aberdeen, Miss., c/o C. C. Clark, West Point, awarded contract for the construction of a bottling plant to Addison Brannon, Aberdeen. Estimated cost $15,000.

Bottling Plant—Alabama Coca Cola Bottling Co., Anniston, Ala., will soon award contract for the construction of a 2 story 71 x 130 ft. bottling plant. Estimated cost $75,000.

Brewery—Budweiser Brewery Co. of Canada Ltd., Belleville, Ont., awarded contract for rebuilding plant destroyed by fire to Patterson Construction Co., Belleville. Estimated cost $50,000. New equipment will be installed.

Candy Factory—Burnham Candy Co., 2355 Leavenworth St., San Francisco, Calif., awarded contract for a 2 and 3 story factory at 46th and Telegraph Sts., to Vogt & Davidson, 185 Stevenson St., San Francisco. Estimated cost $40,250.

Candy Factory—Jenny Lind Candy Co. Ltd., 1011-12 Star Bldg., Toronto, Ont., awarded contract for the construction of a 5 story, 53 x 112 ft. candy and confectionery factory to Sullivan & Fried, 81 Victoria St., Toronto. Estimated cost $85,000.

Candy Factory—W. F. Schraffts Co., 529 Main St., Charlestown, Mass., awarded contract for a 6 story, 200 x 485 ft. factory on Main St. to Turner Construction Co., 137 Newbury St., Boston.

Canning Plant—D. A. Caley, c/o Glover-Burne Co., Tampa, Fla., plans the construction of a canning plant on 8 acre tract south of Michigan Ave. bridge. Owners name withheld.

Canning Plant—Campbell Soup Co., c/o Continental Can Co., 1 Pershing Sq., New York, N. Y., is having plans prepared for a 5 story, 130 x 340 ft., canning plant on Arch St. Camden, N. J. Estimated cost $150,000. Francisco & Jacobus, 511 5th Ave., New York, N. Y., are architects.

Creamery—Challenge Creamery & Butter Association, 307 Montgomery St., San Francisco, Calif., will soon receive bids for the construction of a 2 story creamery at 18th and York Sts. Estimated cost to exceed $40,000. D. A. Reidy, Pacific Bldg., San Francisco, is architect.

Creamery—I. R. and P. H. Caughman, Columbia, S. C., plan the construction of a 2 story creamery. Estimated cost $30,000.

Creamery Equipment—Georgian Bay Creamery, Ltd., D. Glenn, Gen. Mgr., North Bay, Ont., interested in prices on complete new equipment for plant to replace fire loss. $25,000.

Creamery—Jersey Farm Creamery, San Mateo, Calif., awarded contract for the construction of a creamery at Bayshore Highway to F. Boring, 1045 Balboa Ave., Burlingame. Estimated cost $42,500.

Dairy Plant — Foremost Dairy Products Co., Inc., c/o H. M. Rogers, 127 Ellis St. N. E., Atlanta, Ga., receiving bids for additions and alterations to plant.

Dairy Plant—Isaly Dairy of Pittsburgh, 1033 Mahoning Ave., Youngstown, O., awarded contract for the construction of a 3 story, 120 x 120 ft. dairy plant at Pittsburgh, Pa., to Henry Busse Co., 112 Wabash Ave., Pittsburgh. Estimated cost $200,000.

Dairy Plant—G. Willaredt, 411 23rd St., West New York, N. J., Archt., will receive bids about Oct. 1 for a 2 story, 28 x 155 ft. addition to dairy plant at 45th St. and New York Ave., Union City, N. J. for Consumers Dairy Co., 400 45th St., Union City. Estimated cost $45,000.

Dairy Plant—Willida Dairy Co., South Bend, Ind., awarded contract for the construction of a 1 story, 64 x 208 ft. dairy building on Louise St. to R. Sollitt, 518 East Sample St. Estimated cost $45,000.

Ice Cream Plant — Malden Ice Cream Co., 84 Exchange St., Malden, Mass., will soon receive bids for a 1 and 2 story addition to plant. Estimated cost $40,000. A. W. K. Billings, 80 Boylston St., Boston, is architect.

Ice Cream Plant—Telling-Belle Vernon Co., 231 East Exchange St., Akron, O., will soon award contract for a 3 story, 104 x 122 ft. ice cream plant at West Cedar and Water Sts. Braziell & Anderson, 309 4th Ave., Pittsburgh, Pa., are architects.

Dry Milk Products Plant — Dee Hy Food Products Ltd, St. Marys, Ont., will soon start work on additions and alterations to plant. Contract for equipment awarded.

Milk Pasteurizing Plant—Lauderdale Dairies Inc., M. G. Ness, Mgr., Meridian, Miss., awarded contract for the construction of a 1 story, 60 x 60 and 15 x 16 ft. plant at 27th Ave. and 5th St. to L. B. Priester & Son, 1402 12th Ave., Meridian. Estimated cost $40,000.

Cold Storage Plant—F. R. Bennett, Eastman, Ga., plans the construction of a cold storage plant. Estimated cost $35,000.

Cold Storage Plant—Commonwealth of Pennsylvania, Warren State Hospital, Warren, Pa., will soon award contract for additions and alterations to cold storage plant at State Hospital. J. E. Woodwell, 501 5th Ave., New York, N. Y., is engineer.

Cold Storage Plant, Bakery, Etc.—Dpt. of Public Welfare, Ninth and Oak Sts., Columbus, O., awarded contract for the construction of a group of buildings including cold storage plant, kitchen and bakery at Cleveland State Hospital, Cleveland, to G. H. Moehlman, Norwalk. Estimated cost $70,400.

Cold Storage and Refrigeration Plant—Southside Marketing & Finance Corp., Hopewell, Va., B. F. Harris, Petersburg, Pres., has been chartered with authorized maximum capital stock of $50,000 to construct and maintain a cold storage and refrigeration plant.

Power House—Quincy Market Cold Storage & Warehouse Co., 178 Atlantic Ave., Boston, Mass., awarded contract for a 70 x 77 ft. power house to Aberthaw Co., 80 Federal St., Boston. Estimated cost $100,000.

Ice and Cold Storage Plant—Coast Ice & Cold Storage Co., E. E. Huddleson, Pres., Santa Cruz, Calif., plans the construction of an ice and cold storage plant. Estimated cost $40,000.

Ice and Cold Storage Plant—Petaluma Ice & Cold Storage Co., Petaluma, Calif., awarded contract for the construction of a 40 ton ice and cold storage plant to Gay Engineering Corp., 2650 Santa Fe St., Los Angeles. Estimated cost $42,500.

Ice and Cold Storage Plant—West Texas Utilities Co., c/o T. A. W. Stern, Abilene, Tex., will build a 1 story, 30 x 50 ft. ice and cold storage plant, 30 ton capacity at Eldorado. Estimated cost $32,000. Private plans. Work will be done by day labor.

Ice Manufacturing Plant—Hain Bros., Meadow St., Norwalk, Conn., awarded contract for the construction of a 1 story, 55 x 150 ft. ice manufacturing plant to T. Lanese, 190 Calhoun Ave., Bridgeport. Estimated cost $40,000.

Ice Plant—Briola Bros., 10th Ave., Ambridge, Pa., will soon award contract for a 1 story ice plant including equipment at 10th and Glenwood Sts. Estimated cost $60,000. Private plans.

Ice Plant — J. A. Hill, 90 Pond St., Natick, Mass., is having plans prepared for an artificial ice plant on West Central St. Estimated cost $75,000. C. Coneby Engineering & Construction Co., 1580 Ansol Rd., Cleveland, O., is engineer.

Ice Plant—Mongiello Bros., 625 Communipaw Ave., Jersey City, N. J., will soon award contract for the construction of a 1 story, 100 x 100 ft. ice plant. Estimated cost $40,000. C. H. Ziegler, 26 Journal Sq., Jersey City, is architect.

Produce Market—Texas Ice & Refrigerating Co., c/o C. Goodfellow, 1201 Jones St., Fort Worth, Tex., plans the construction of a produce market between 10th and 12th Sts. Estimated cost including $500,000.

Refrigeration Plant, Etc.—St. Louis, Refrigeration & Cold Storage Co., 1300 Lewis St., St. Louis, Mo., awarded contract for a 2 story, 65 x 70 ft. refrigeration plant and sub-station at 1304 Clark Ave. to McCormack-Combs Construction Co., Columbia Bldg., St. Louis. Estimated cost $40,000.

Plant — Corn Products Refining Co., 608 Brokers St., Kansas City, Mo., awarded contract for addition to plant to Bedford Construction Co., 200 East Illinois Ave., Chicago, Ill. Estimated cost $250,000.

Fish Cultural Station, Etc.—Bureau of Fisheries, Washington, D. C., plans the construction of a 1 story, 30 x 32 ft. fish cultural station and sub-station in Pennsylvania. Estimated cost $100,000. G. A. Schneider, c/o Bureau of Fisheries, Washington, is architect.

Fish Hatchery—Texas Game, Fish & Oyster Commission, c/o W. J. Tucker, Jasper, Tex., will receive bids until Sept. 10, for the construction of a fish hatchery. Estimated cost $125,000. J. Marks, Jasper, is engineer.

Warehouse — Pacific Fruit Express Co., Nampa, Idaho, is receiving bids for remodeling present plant, constructing lumber shed, 50 x 100 ft. and extension to boiler room 14 x 22 x 15 ft. Estimated cost $25,000.

Grocery Distribution Plant—Kroger Grocery & Baking Co., 7th and Walnut Sts., Cincinnati, O., will soon award contract for a 1 and 2 story, 250 x 300 ft. grocery distribution plant at Carbondale, Ill. Estimated cost $125,000. E. H. Niemann, 3816 Shaw Ave., St. Louis, Mo., is architect.

Terminal Building—H. C. Bohack Co., Flushing and Metropolitan Aves., Long Island City, N. Y., is having preliminary sketches made for the construction of a terminal building at Newtown Creek, Maspeth. Estimated cost $2,000,000. Koch & Wagner, 32 Court St., Brooklyn, are architects.

Sausage Factory—Richter Food Products Co., 2910 Armitage Ave., Chicago, Ill., will soon award contract for a 2 and 3 story, 265 x 345 ft. sausage factory at Randolph and Carpenter Sts. Estimated cost $500,000. H. P. Henschien, 59 East Van Buren St., Chicago, is architect.

Warehouse—Jewel Tea Co., 907 Sterrett Ave., Pittsburgh, Pa., awarded contract for a 2 story, 70 x 100 ft. warehouse at Forbes and McDevitt Pl. to Cuthbert Bros. Co., Bessemer Bldg., Pittsburgh.

Cereal Products Plant—Cereal Products Refining Co., Fulton and Webster Sts., San Francisco, Calif., awarded contract for a 2 story plant to R. J. H. Forbes, Monadnock Bldg., San Francisco. Estimated cost $45,000.

Feed Mill—Gooch Milling & Elevator Co., Lincoln, Neb., awarded contract for a feed mill to Olson Construction Co., Lincoln. Estimated cost $65,000.

Grain Elevator—Assiniboine Grain Co., St. Boniface, Man., plans the construction of a grain elevator. Estimated cost $100,000.

Grain Elevator—Chesapeake & Ohio Ry. Co., Richmond, Va., awarded masonry and carpentry contracts for a 49 x 364 ft. grain elevator at 103rd St. and Calumet River, Chicago, Ill. Estimated cost $150,000. C. W. Johns, Richmond, is chief engineer.

Grain Elevator—International Milling Co., 120 Childs St., Buffalo, N. Y., awarded contract for foundation for addition to grain elevator to The Gow Co. Inc., 31 St. James Ave., Boston, Mass. Estimated total cost $350,000. Equipment including 100 storage bins 150 ft. high will be required.

Grain Elevator—Pioneer Elevator Co., Dubuc, Sask., plans the construction of a grain elevator, 50,000 bu. capacity.

Grain Elevator—H. I. Price Securities Ltd., 80 King St. W., Toronto, Ont., awarded contract for the construction of a grain elevator, 4,000,000 bu. capacity at Kingston to Barnett & McQueen Ltd., Port Arthur.

Grain Elevator Addition—Kimbell Milling Co., 1800 South Main St., Fort Worth, Tex., received lowest bid for addition to grain elevator 500,000 bu. capacity including 16 tanks from Jones-Hettelsater Construction Co., 600 Mutual Bldg., Kansas City, Mo.

Grain Elevator Addition—Rosenbaum Bros., 140 West Van Buren St., Chicago, Ill., awarded contract for addition to grain elevator, 1,000,000 bu. capacity at South Chicago to M. A. Long Co., 332 South La Salle St., Chicago.

Grain Elevator Addition—Salina Terminal Elevator Co., c/o J. J. Vanier, Salina, Kan., awarded contract for addition to grain elevator, 500,000 bu. capacity making a total of 1,000,000 bu. to Chalmers & Borton, 620 Pioneer Trust Bldg., Kansas City, Mo.

Packing Plant (Citrus)—Ridge Citrus Canners Inc., Lake Wales, Fla., recently incorporated, plans the construction of a 100 x 200 ft. packing plant including equipment. Estimated cost $60,000.

Packing Plant (Fruit and Vegetable)—State Prison Farm, c/o F. Tiller, Secy., Rosenberg, Tex., is having preliminary plans prepared for the construction of a fruit and vegetable packing plant at Sugarland. Estimated cost $45,000. F. E. Giesecke, A. & M. College, College Station, is architect. L. D. Royer, Smith- Young Tower, San Antonio, is engineer. Work will be done by convict labor.

Packing Plant—Kingan & Co., 153 Alabama St., Atlanta, Ga., awarded contract for the construction of a 2 story, 70 x 137 ft. packing plant Peters and Fair Sts. to Brazell-Miller & Newbanks Inc., Norris Bldg., Atlanta. Estimated cost $110,000.

Packing Plant—Cleveland Provision Co., H. A. Schanz, Pres. and Treas., 2527 Canal Rd., Cleveland, O., plans the construction of a 2 story packing plant at 3378 West 65th St. Estimated cost $200,000. H. B. Henschein, 1637 Prairie Ave., Chicago, Ill., is engineer.

Packing Plant (Meat)—R. R. Pinkney & Associates, c/o Blayney-Murphy Packing Co., 4801 Gilpin St., Denver, Colo., plan the construction of a meat packing plant at Amarillo, Tex. Estimated cost $250,000.

Packing Plants (Meat) and Storage Building, Etc.—Swift & Co., Packers and Exchange Aves., Chicago, Ill., plans a 2 story, 48 x 51 ft. packing plant and storage building including refrigeration unit for meat cooling and chicken freezing at Cuero, Tex. $60,000. Also plans to rebuild packing plant on West Commerce St., Youngstown, O., recently destroyed by fire. $50,000.

Poultry Warehouse — Poultry Producers of Central California, 700 Front St., San Francisco, Calif., are having plans prepared for the construction of a 3 story warehouse at Vallejo and Sansome Sts. Estimated cost $150,000. H. C. Baumann, 251 Kearny St., San Francisco, is architect.

Building Construction in the Food Industries

Building Contracts of $40,000 or more for producing food, awarded in the first seven months of 1930 totaled $13,182,000. This covers 147 projects, the average thus being $89,500. A classification follows:

	No.	Value
Bakeries	21	$2,447,000
Bottling	11	524,000
Canneries	13	1,959,000
Cheese	1	40,000
Confectioneries	2	80,000
Creameries	10	880,000
Dairies	14	1,133,000
Flour	1	125,000
Ice Mfg.	27	1,756,000
Ice Cream	6	718,000
Macaroni	2	140,000
Milk Condensary	1	35,000
Milling (Exclusive of Flour)	9	955,000
Packing	22	1,488,000
Pickles	1	44,000
Provisions	1	40,000
Salt	2	650,000
Starch	1	100,000
Walnuts	2	68,000
	147	$13,182,000

In addition to these 147 large building jobs, Food Industries has published news of 391 other building projects.